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PATENT & TRADEMARK OFFICE

I hereby certify that this correspondence is being filed by First Class Mail, postage prepaid, to the Commissioner of Patents P.O. Box 1450, Alexandria, VA 20313-1450
Signature Isabel R. Lincoln **Date signed:** June 3, 2009
Isabel R. Lincoln

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

IN RE APPLICATION OF:	Guenther Heinz	)	
		)	Examiner:
FILED:	01/02/2002	)	Kruer, Stefan
SERIAL NO:	10/037,427	)	Cuomo, Peter, SPE
DOCKET:	B01-085A	)	Art Unit: 3654
FOR:	Lift Belt and System	)	

APPEAL BRIEF UNDER 37 CFR §41.37

Commissioner of Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

Appellants timely filed a Notice of Appeal for the above-identified application on April 9, 2009, appealing the final rejection of claims 1-26, 28-31, 33-38 and 43-45. Under 37 CFR §41.37, Appellants respectfully submit this Appeal Brief in triplicate to the Board of Patent Appeals and Interferences (Board). Annexed to this Appeal Brief and labeled Claims Appendix is a copy of rejected claims 1-26, 28-31, 33-38 and 43-45.

Please charge any fees for filing this Appeal Brief as provided in 37 CFR §41.20 to Appellants' deposit account no. 07-0475, in the name of Gates Corporation.

(i) Real Party in Interest

The real party in interest for the above-identified patent application is Gates Corporation, assignee of inventors Guenther Heinz and Hans Metzen.

(ii) Related Appeals and Interferences

There are no other appeals or interferences known to Appellants, Appellant's legal representative or Assignee that will directly affect or be directly affected by or have a bearing upon the Board's decision in the pending appeal of the above-identified patent application.

(iii) Status of Claims

Claims 1-26, 28-31, 33-38 and 43-45 are rejected.

Claim 27 is withdrawn from consideration.

Claims 1-26, 28-31, 33-38 and 43-45 are appealed.

(iv) Status of Amendments

There have not been any amendments filed subsequent to the Final Office Action mailed 02/04/2009.

(v) Summary of the Claimed Subject Matter

References to drawings and to the specification by page and line number (Fig. ___; x: y-y) for each of the independent claims 1, 13, 26, 28, 43, 44, 45 are as follows.

1. (Rejected) A lift belt comprising:

an elastomeric body **(20)(Fig. 1, 3:20-21)** having a width w **(Fig. 1, 3:30)** and a thickness t **(Fig. 1; 3:20-21)** and having a pulley engaging surface **(25)(Fig. 1; 4:25)**;

the elastomeric body having an aspect ratio w/t that is greater than 1 **(Fig. 1; 3:30-31)**;

a tensile cord **(15)(Fig. 1; 3:20-21)** contained within the elastomeric body and extending longitudinally;

the pulley engaging surface having a ribbed profile extending longitudinally **(Fig. 1; 4:1-2)**; and

the ribbed profile having a rib with an angle of approximately 90° **(Fig. 1; 5:1-5)**.

13. (Rejected) An elevator lift system comprising:

a belt having an elastomeric body **(20)(Fig. 1, 3:20-21)** having a width w **(Fig. 1, 3:30)** and a thickness t **(Fig. 1; 3:20-21)** and having a pulley engaging surface **(25)(Fig. 1; 4:25)**;

the elastomeric body having an aspect ratio w/t that is greater than 1 **(Fig. 1; 3:30-31)**;

a tensile cord **(15)(Fig. 1; 3:20-21)** contained within the elastomeric body and extending longitudinally;

the pulley engaging surface having a ribbed profile extending longitudinally **(Fig. 1; 4:1-2)**;

the ribbed profile having a rib with an angle of approximately 90° **(Fig. 1; 5:1-5)**; and

at least one pulley **(P1)(Fig. 3; 6:27-29)** having a ribbed profile engaged with the pulley engaging surface.

26. (Rejected) A lift system comprising:

a belt having an elastomeric body **(20)(Fig. 1; 3:20-21)** having a width w **(Fig. 1; 3:30)** and a thickness t **(Fig. 1; 3:20-21)** and having a pulley engaging surface **(25)(Fig. 1; 4:25)**;

the elastomeric body having an aspect ratio w/t that is greater than 1 **(Fig. 1; 3:30-31)**;

a tensile cord **(15)(Fig. 1; 3:20-21)** contained within the elastomeric body and extending longitudinally;

the pulley engaging surface having a ribbed profile extending longitudinally **(Fig. 1; 4:1-2)**;

the ribbed profile having a rib with an angle of approximately 90° **(Fig. 1; 5:1-5)**;

at least one pulley **(P1)(Fig. 3; 6:27-29)** having a ribbed profile engaged with the pulley engaging surface; and

an electric circuit for detecting a tensile cord load and for controlling operation of the system **(Fig. 4; 7:17-30)**.

28. (Rejected) A lift belt comprising:

an elastomeric body **(20)(Fig. 1; 3:20-21)** having a width w **(Fig. 1; 3:30)** and a thickness t **(Fig. 1; 3:20-21)** and having a pulley engaging surface **(25)(Fig. 1; 4:25)**;

the elastomeric body having an aspect ratio w/t that is greater than 1 **(Fig. 1; 3:30-31)**;

a tensile cord **(15)(Fig. 1; 3:20-21)** contained within the elastomeric body and extending longitudinally;

the pulley engaging surface having a ribbed profile **(Fig. 1; 4:1-2)**; and

the ribbed profile having a rib with a rib angle of approximately 90° **(Fig. 1; 5:1-5)**.

43. (Rejected) A lift belt comprising:

an elastomeric body **(20)(Fig. 1; 3:20-21)** having a width w **(Fig. 1; 3:30)** and a thickness t **(Fig. 1; 3:20-21)** and having a pulley engaging surface **(25)(Fig. 1; 4:25)**;

the elastomeric body having an aspect ratio w/t that is greater than 1 **(Fig. 1; 3:30-31)**;

a tensile cord **(15)(Fig. 1; 3:20-21)** contained within the elastomeric body and extending longitudinally;

the pulley engaging surface having a ribbed profile extending longitudinally along the elastomeric body **(Fig. 1; 4:1-2)**; and

the ribbed profile having a rib with an angle of approximately 90° **(Fig. 1; 5:1-5)**.

44. (Rejected) An elevator lift system comprising:

a belt having an elastomeric body **(20)(Fig. 1; 3:20-21)** having a width w **(Fig. 1; 3:30)** and a thickness t **(Fig. 1; 3:20-21)** and having a pulley engaging surface **(25)(Fig. 1; 4:25)**;

the elastomeric body having an aspect ratio w/t that is greater than 1 **(Fig. 1; 3:30-31)**;

a tensile cord **(15)(Fig. 1; 3:20-21)** contained within the elastomeric body and extending longitudinally;

the pulley engaging surface having a ribbed profile extending longitudinally **(Fig. 1; 4:1-2)** and having a rib with an angle of approximately 90° **(Fig. 1; 5:1-5)**; and

at least one pulley **(P1)(Fig. 3; 6:27-29)** having a ribbed profile engaged with the pulley engaging surface.

45. (Rejected) A lift belt comprising:

an elastomeric body **(20)(Fig. 1; 3:20-21)** having a pulley engaging surface **(25)(Fig. 1; 4:25)**;

a tensile cord **(15)(Fig. 1; 3:20-21)** contained within the elastomeric body and extending longitudinally;

the pulley engaging surface having a ribbed profile **(Fig. 1; 4:1-2)**, the ribbed profile extending longitudinally along the elastomeric body; and

the ribbed profile having a rib with a rib angle of approximately 90° **(Fig. 1; 5:1-5)**.

****

Lifting systems, including elevators, generally comprise a rope or lift belt which bears the weight of an elevator cage or other load. The lift belt is engaged in some manner with the load and a pulley or pulleys, as well as with a driver such as an electric motor. The lift belt may comprise a flat belt. The flat belt comprises a tensile cord enclosed in an elastomeric body, and a width dimension w that is greater than a thickness dimension t. The flat belt engages lift sheaves, the sheaves have a flat belt bearing surface and side flanges. The lift sheaves may also comprise a rubber material on the pulley belt bearing surface.

The present invention as embodied in independent claims 1, 13, 26, 28, 43, 44, 45 is directed to a lift belt and system having a lift belt with a ribbed surface, each rib having a rib angle of approximately 90°. More particularly, the inventive belt 10 comprises tensile cords 15 encased within elastomeric body 20. The elastomeric

body may comprise natural and synthetic rubbers, HNBR, EPDM, or any combinations and equivalents thereof. The tensile cords may comprise any material having a tensile strength sufficient for the intended use. The tensile cords may comprise polyester, carbon, steel, aramid, and combinations and equivalents thereof. The tensile cords comprise flexibility sufficient to allow a belt to bend to engage a pulley circumference.

The belt has a width W and a thickness t. It also comprises an aspect ratio wherein W/t is greater than one.

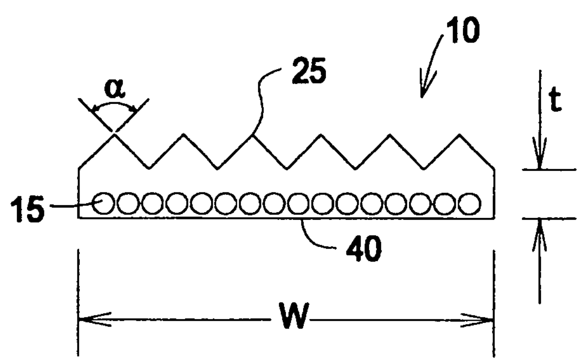

FIG.1

A pulley engaging surface 25 describes a ribbed profile. The pulley engaging surface further comprises a fiber loading. The fibers may comprise cellulose, aramid, polyester, cotton, nylon, carbon, acrylic, polyurethane, glass individually or in combination, or any other equivalent material(s) known in the art. The fibers have a length of approximately 18 μm and a thickness of approximately 15 μm in the

preferred embodiment, although it is acceptable for the fibers to have a length in the range of approximately 10 μm to 30 μm and a thickness in the range of approximately 10 μm to 20 μm. The fibers are loaded in the elastomeric in an amount of approximately 25 to 30 phr with the preferred amount of approximately 28.7 phr. The fibers extend from a belt rib pulley engaging surface. The fibers enhance an engagement friction between a belt rib and a pulley groove. They also reduce pulley engaging surface wear. They also prevent cracks from developing in the ribs during operation, thereby extending a belt life expectancy.

Belt 10 also comprises a jacket 40. Jacket 40 may comprise polyamide, polyurethane, polyethylene, woven or non-woven fabric, or any equivalent material known in the art. Jacket 40 significantly reduces wear caused by the back or flat side of the belt engaging a "back-side" pulley as described elsewhere in this specification.

In operation, the belt is self-guiding due to each rib engaging a pulley groove. The self-guiding feature eliminates the need for flanged pulleys which are otherwise required for prior art flat belts. This reduces a cost of the pulleys used in a system.

A rib angle α increases a belt rib surface engaging a pulley groove. Although the rib angle may be in the range of approximately 60° to 120°, the preferred rib angle is approximately 90° to maximize the pulley engaging surface area.

In the case of an approximate 90° rib angle, angle α increases a pulley engaging surface area by a factor of approximately $\sqrt{2}$. Increasing the belt surface engaging a pulley in this manner increases the torque which can be transmitted by a lift pulley. This in turn increases the load capacity of a lift system. Put another way, for a given load and torque the inventive belt will have a lesser width w that a prior art flat belt. This, in turn, results in a system with a reduced space requirement as compared to a prior art flat belt system.

Use of the ribs also has the desirable effect of decreasing an operating noise level as the belt engages each pulley. The use of a grooved pulley with the inventive belt also eliminates the need for a rubber coating on the pulley.

At least one of the tensile cords comprise a conductive material having a resistivity, for example steel, as well as conductive equivalents known in the art. A resistance of a tensile cord material will vary according to the load and temperature in a roughly linear manner known in the art. In ferrous materials such as steel, a change in resistance is usually proportional to a change in temperature. As a result a temperature effect is known and can be compensated, thus leaving a resistance change based upon a load to be measured.

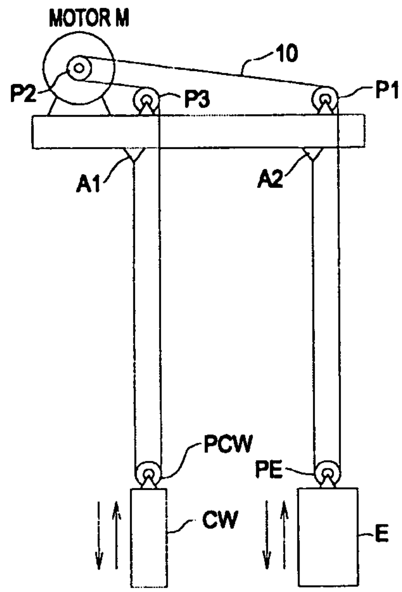

FIG.3

A resistance and variation in resistance may be measured on a Wheatstone bridge or other equivalent voltage bridge device, see Fig. 4. The variation is correlated to a load on the tensile cord and, in turn, the belt. This provides a measurement of a load magnitude.

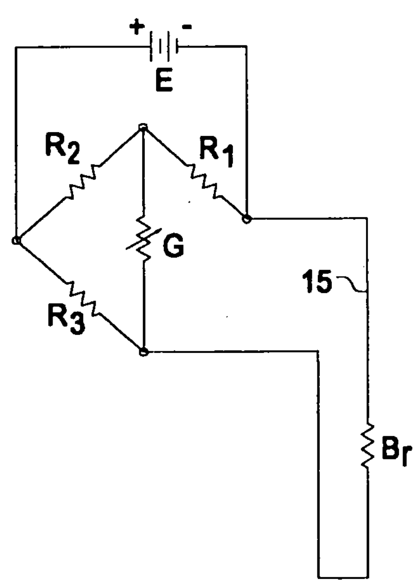

FIG.4

For example, an operator may use this load magnitude measuring feature to control operation of a system motor and therefore of an elevator, fork lift or equivalent lift device. More particularly, if a load detecting circuit indicates an overload situation or tensile cord failure, the motor and system may be shut down, automatically or manually, for attention by an operator.

(vi) Grounds of Rejection to be Reviewed on Appeal

1. Whether the rejection of claims 1, 4, 6, 13, 16, 28, 31 and 43-45 under 35 USC 102(b) as being anticipated by Winninger et al (US 6,033,331) in view of Conrad (3,980,174) should be sustained.

2. Whether the rejection of claims 2 and 5, 14, 17 and 29 under 35 USC 103(a) as being unpatentable over Winninger et al and Conrad as applied to Claims 1, 13, 16 and 28, and in further view of Adifon et al (WO 99/43598) should be sustained.

3. Whether the rejection of claims 3, 7, 15, 18-19, 21-22 and 30 under 35 USC 103(a) as being unpatentable over Winninger et al, Conrad and Adifon et al, as applied to claims 2, 14 and 29, and in further view of Suhling (DE 3,934,654) and Siefert (US 3,662,596) should be sustained.

4. Whether the rejection of claims 7 and 19 under 35 USC 103(a) as being unpatentable over Winninger et al, White et al, Adifon et al, Suhling and Seifert as applied to claims 3 and 15, and in further view of White, Jr. et al (US3,981,462) should be sustained.

5. Whether the rejection of claims 8-10 and 20 under 35 USC 103(a) as being unpatentable over Winninger et al, Conrad, Adifon et al, Suhling and Seifert, and White as applied to claims 7 and 19, and in further view of Stork (US 3,948,113) should be sustained.

6. Whether the rejection of claims 11 and 23 under 35 USC 103(a) as being unpatentable over Winninger et al and Conrad as applied to claims 1 and 13, respectively and in further view of Siefert should be sustained.

7. Whether the rejection of claims 12 and 24 under 35 USC 103(a) as being unpatentable over Winninger et al and Conrad as applied to claims 1 and 13, respectively, and in further view of Suhling should be sustained.

8. Whether the rejection of claims 25, 33-34 and 36-37 under 35 USC 103(a) as being unpatentable over Winninger et al and Conrad as applied to claims 1, 13 and 33 respectively, and in further view of Stork should be sustained.

9. Whether the rejection of claim 26 under 35 USC 103(a) as being unpatentable over Winninger et al and Conrad and Suhling and in further view of Seifert should be sustained.

10. Whether the rejection of claims 35 and 38 under 35 USC 103(a) as being unpatentable over Winninger et al, Conrad, Suhling and Seifert, as applied to claim 26, and in further view of Stork should be sustained.

The rejected claims do not stand or fall together for each ground of rejection which Appellants contest. It is requested that the patentability of each individual claim be considered on its merits as argued below.

(vii) Argument

I. THE EXAMINER HAS FAILED TO ESTABLISH A *PRIMA FACIE* CASE OF OBVIOUSNESS UNDER 35 USC §103(a) OF EACH OF THE REJECTED CLAIMS 1-26, 28-31, 33-38 and 43-45.

It is well established under patent law that the Examiner bears the initial burden of factually supporting any *prima facie* conclusion of obviousness. Thus, the Examiner has the burden of going forward with the production of evidence that the claimed combination of the rejected claims is obvious in the sense of 35 USC §103(a). See _In re Rinehart_, 189 USPQ 143 (CCPA 1976). Similarly, the Examiner must provide some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness. _In re Kahn_, 441 F. 3d 977, 988 (Fed. Cir. 2006). (cited with approval in _*KSR Int'l v. Teleflex Inc.*_, 550 US 398, 127 S. Ct. 1727, 1740-41, 82 USPQ 2d 1385, 1396 (S.Ct.2007)). As a corollary to the foregoing, the Examiner must articulate an adequate rationale for combining the multiple references in the manner asserted to meet the claimed invention.

While the Supreme Court in *KSR* did not totally reject the use of "teaching, suggestion or motivation", as a factor in the obviousness analysis, it did reject a rigid application of the "teaching, suggestion or motivation" test. The Court noted that the analysis supporting a rejection under 35 USC §103(a) should be made explicit, and that it was "important to identify a reason that would have prompted a person of ordinary skill in the relevant to combine the [prior art] elements in the manner claimed". The Court specifically stated:

> Often it will be necessary ... to look to interrelated teachings of multiple patents; the effects of demands known to the design

> community or present in the marketplace; and the background knowledge possessed by a person having ordinary skill in the art, all in order to determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue. To facilitate review, this analysis should be made explicit. Id. 550 at 418.

Further, the court has clearly held that <u>all</u> of the limitations must be taught or suggested by the references:

> "Obviousness is tested by "what the combined teachings of the references would have suggested to those of ordinary skill in the art." *<u>In re Keller,</u>* 642 F.2d 413, 425, 208 USPQ 871, 881 (CCPA 1981). But it "cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching or suggestion supporting the combination." *<u>ACS Hosp. Sys.,</u>* <u>732 F.2d at 1577, 221 USPQ at 933</u>. And "teachings of references can be combined *only* if there is some suggestion or incentive to do so." *Id.* Here, the prior art contains none. Instead, the Examiner relies on hindsight in reaching his obviousness determination. But this court has said, "To imbue one of ordinary skill in the art with knowledge of the invention in suit, when no prior art reference or references of record convey or suggest that knowledge, is to fall victim to the insidious effect of a hindsight syndrome wherein that which only the inventor taught is used against its teacher."" *<u>In re Fine</u>* 837 F.2d 1071 (C.A.Fed.1988).

Claims 1, 4, 6, 13, 16, 28, 31 and 43-45

1. Whether the rejection of claims 1, 4, 6, 13, 16, 28, 31 and 43-45 under 35 USC 102(b) as being anticipated by Winninger et al (US 6,033,331) in view of Conrad (3,980,174) should be sustained.

The Applicant attended an interview at the USPTO with Examiner Kruer and SPE Cuomo on June 11, 2008. During the interview the Examiners and the undersigned agreed that "a rib with an angle of approximately 90° in view of the prior art of record...appears to overcome the prior art of record subject to an updated search." See attached Evidence Appendix; Interview Summary dated 11 June 2008.

The art cited on the Interview Summary is Winninger et al, White, Jr et al, Adifon et al and McKay. The Interview Summary establishes that Winninger, and the others listed, do not teach a rib with an angle of approximately 90°. Please note that all of the final 103 rejections appealed from rely on Winninger as the primary reference.

Following the interview, the Examiner mailed a non-final office action dated 8/19/2008 which retained Winninger as the primary reference and added Conrad as a new reference. Applicant filed an argument directed to all rejections including Conrad dated 17 November 2008.

In the Final Rejection mailed 02/04/2009, the Examiner added no new references beyond Conrad. Conrad is the secondary reference in all rejections with the sole exception of the rejection of claims 7 and 19.

Since the interview record is clear as to the deficiencies of Winninger, this case arguably turns on the teachings of Conrad. In the following arguments, Appellant demonstrates that Conrad does not teach a rib having an angle of approximately 90°. Conrad simply teaches a longitudinal notch in an otherwise rectangular rib.

All of the claim limitations must be taught or suggested by the prior art to establish *prima facie* obviousness of the claimed invention. In re Royka, 180 USPQ 580 (CCPA 1974). A rejection based on 35 USC §103(a) must rest on a factual basis, with the facts being interpreted without a hindsight reconstruction of the invention from the prior art. Thus, in the context of the analysis under Section 103, *arguendo*, it is not sufficient to merely identify one reference (Winninger) that teaches some of the limitations of a claim combined with others (Conrad, Adifon, Suhling. Siefert, White, Stork) that teaches other limitations of a claim to support a rejection based on obviousness. This is because obviousness is not established by combining the basic disclosures of the prior art to produce the claimed invention absent a teaching, suggestion or "apparent reason" that the combination be made. *Interconnect Planning Corp. v. Fiel*, 227 USPQ 543, 551 (Fed. Cir. 1985); *In re*

Corkhill, 226 USPQ 1005, 1009-110 (Fed. Cir. 1985); and *In re Kahn*, 441 F.3d 977 (Fed. Cir. 2006). The relevant analysis invokes a cornerstone principle of patent law:

> That all elements of an invention may have been old (the normal situation), or some old and some new, or all new, is ... simply irrelevant. Virtually all inventions are combinations and virtually all are combinations of old elements. *Environment Designs v. Union Oil Co. of Cal.*, 218 USPQ 865, 870 (Fed. Cir. 1983) (Other citations omitted)

As the Court of Appeals for the Federal Circuit has noted, "[w]hen a rejection depends on a combination of prior art references, there must be some teaching, suggestion or motivation to combine the references." *Ecolochem, Inc. v. Southern Calif. Edison*, 56 USPQ 2d 1065, 1073 (Fed. Cir. 2000). This is because "combining prior art references without evidence of such a suggestion, teaching or motivation simply takes the inventor's disclosure as a blueprint for piecing together the prior art to defeat patentability." Id.

Accordingly, to establish a rejection under 35 USC §103, a person of ordinary skill in the art must not only have had some motivation to combine the prior art teachings, but also some motivation to combine the prior art teachings in the particular manner claimed. See e.g. *In re Kotzab*, 55 USPQ 2d 1313, 1318 (Fed. Cir. 2000). Further, as discussed in *KSR*, citing *In re Kahn* with approval, the Examiner must show reasons why the skilled artisan, confronted with the same problems as the

inventors and with no knowledge of the claimed invention, would select the elements from the cited prior art references for combination in the manner claimed. See also In re Rouffet *infra.*

As to independent claims 1, 13, 28, 43, 44, 45 and the depiction of the rib angles in the Winninger figures, Applicant again respectfully asserts that the reference drawings cannot be scaled when the specification otherwise expressly describes the angle depicted. The Federal Circuit has clearly rejected scaling drawings, instead relying on written information in the specification to explain dimensional features:

> "Absent any written description in the specification of quantitative values, arguments based on measurement of a drawing are of little value". *Application of Wright*, 569 F.2d 1124, 193 USPQ 332 (CCPA 1977). "Under our precedent ... it is well established that patent drawings do not define the precise proportions of elements and may not be relied on to show particular sizes if the specification is completely silent on the issue." *Hockerson-Halberstadt, Inc. v Avia Group Intern., Inc.*, 222 F.3d 951, 956 (Fed. Cir. 2000).

This means the drawings cannot be scaled to separately derive information beyond the written description. The law holds that the written specification overrides the visual depiction in the figures.[1]

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[1] It is illustrative to touch on the prosecution requirements relating to 35 USC 112. It is well established that absent full, clear and exact disclosure in the specification, the

The Winninger specification specifically describes the rib angle in terms of ISO 9981, see Winninger 3:32-38.

> properties. Such belt is advantageously of the "striated" type, i. e. its inner surface **22** is shaped like teeth **23**, the pitch P of which is standardized, as well as their triangular cross-section as shown (V belt) or their trapezoidal cross-section, each reference character H, J, K, L and M in the ISO Standard 9981 also defining the belt thickness, as measured between the tooth bottom **24** and the outer surface of the belt. The belt **10** cooperates with pulleys **11**, **12**, **13**, **14**, **15**,

The groove angle (α^3) in ISO 9981 is described as 40 degrees. The pulley groove angle (α^3) corresponds to the rib angle on a belt since it is the belt rib which engages the pulley groove during operation.

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examiner cannot rely on the drawings alone to supply missing information, and in particular incomplete drawings. The court in *In Re Olson*, 41 CCPA 871, 212 F.2d 590 (1954) observed: "It is well known that Patent Office drawings are not normally drawn to scale, with the dimensions and sizes of parts shown to exact measurements as are shop drawings." The court refused to allow "scaling any particular distances or sizes ... when the specification is completely silent in this respect." The Board affirmed the Examiner's rejection of claims [scaled from the drawings] as drawn to new matter." *Olson* concerned the propriety of using only the drawings to attempt to establish that ball centering means were equally spaced from the valve seats, given this limitation was not disclosed at all in the original specification.

Table 1 — Dimensions of PK pulley grooves

Dimensions in millimetres

Groove pitch, e	$\pm 0,05$[1)][2)]	3,56
Groove angle, α[3)], for measuring	$\pm 0° 15'$	40°
Groove angle, α[3)], for testing and actual use	$\pm 1°$	40°
r_t	min.	0,25
r_b	max.	0,5
Checking ball or rod diameter, d_B	$\pm 0,01$	2,5
$2x$	nom.	0,99
$2N$[4)]	max.	1,68
f	min.	2,5

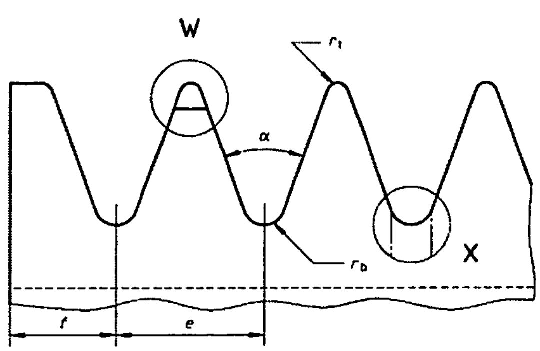
1) The tolerance on e applies to the distance between the axes of two consecutive grooves.

2) The sum of all deviations from the nominal value e for all grooves in any one pulley shall not exceed $\pm$ 0,3.

3) The centreline of the groove shall make an angle of 90° $\pm$ 0,5° with the axis of the pulley.

4) N is not related to the nominal diameter of the pulley but is measured from the actual ride position of the ball or rod in the pulley.

Where the ISO 9981 pulley groove profile referenced in the preceding Table 1 is:



ISO 9981 is set forth in its entirety in the Evidence Appendix. The industry has standardized rib angles of 40°. Please note that the belts taught in Winninger are for rotating equipment. The instant belt does not "move". Instead, an elevator cab moves along the length of the belt from floor to floor.

Winninger Figure 1 (below) does not offer any competent information concerning rib angle. In fact, a close inspection of Winninger Fig. 1 shows each rib (23) as being skewed to one side with one side of each rib (left) being slightly longer than the other side (right) further demonstrating its unreliability for the purpose advanced by the Examiner.

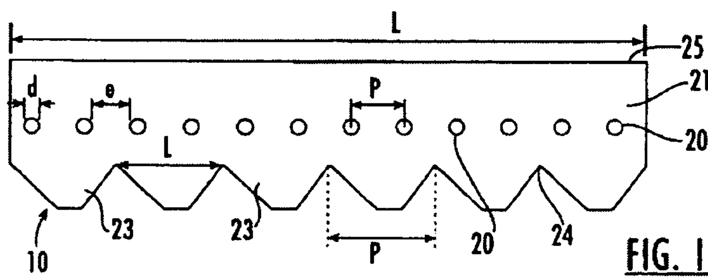


FIG. I.

The prohibition against scaling drawings was discussed during the Interview, and was also addressed in prior Arguments, including the Argument dated October 19, 2007, included in the Evidence Appendix hereto. Continuing reliance on scaling the reference figures in Winninger to teach the claimed rib angle is clearly contrary to settled law.

This brings us to another cornerstone principle of patent law, namely, that "claims are given their broadest reasonable interpretation *consistent with the specification*." (emphasis added) In re Hyatt, 211 F.3d 1367 (Fed.Cir. 2000).

Applicant respectfully asserts that the Examiner's reading of the claims in light of Conrad's teachings is overbroad and is inconsistent with the specification. The

instant belt rib angle is disclosed as "α" in the application specification and is described at page 5, lines 1-5 and in Figure 1.

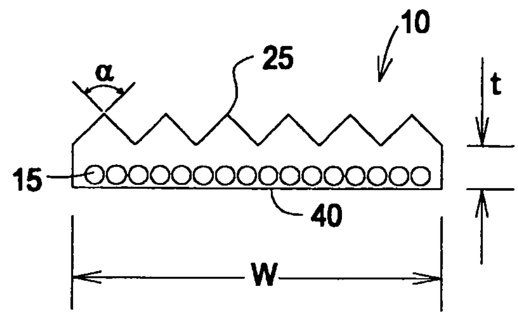


FIG.1

Referring to Figure 1 in the application (above), the angle "α" relates to the relationship between the belt rib sides which sides diverge toward the belt tensile cords 15. Put another way, the claimed belt rib angle α sweeps across and encompasses rib material 25.

On the other hand, angle 48 in Conrad (Figure 4 below) sweeps across and encompasses only void space in rib 40. Conrad Figure 2, below, shows each rib 40.

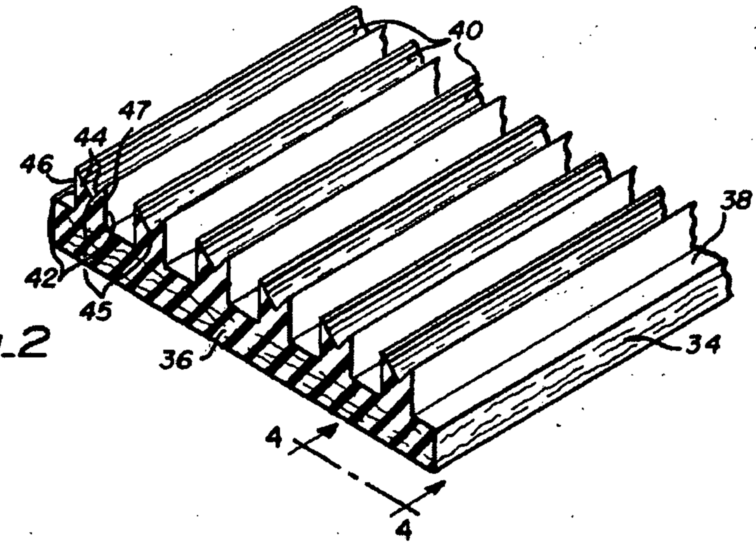


Fig_2

Conrad only teaches an "angle 48 [of] approximately 45°", see Conrad 3:25-26:

> By way of example, in one embodiment, the rib **40** is continuous and the carcass is formed by a four-ply neoprene material. In the preferred embodiment, the bottom surface **44** of rib **40** has an inverted V-shape in transverse cross section and the angle **48** is aproximtely 45°. Alternatively, it will be appreciated that interrupted ribs could also be utilized.

Angle 48 describes the angle between a surface 44 and a line 39, see Conrad 3:14-18 and Figure 4 below.

> depth D. The bottom surface **44** serves to form the rib **40** into a pair of tapered wedging portions **46** and **47.** It should be noted that the concavity of the bottom surface causes an angle **48** to be formed between a line **39** parallel to the plane of the interior surface **38** and the bottom surface **44** near the side surfaces **42.** In accordance with the present invention, the angle **48** should be greater than the angle **30.**

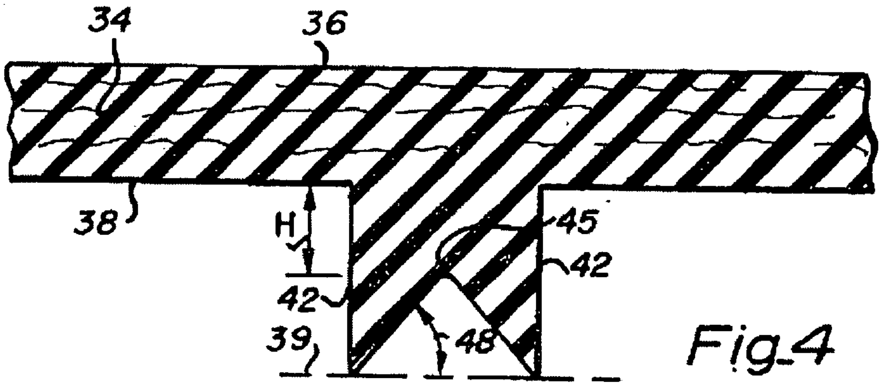


Fig-4

Hence, angle 48 and apex 45 only relate to a "concavity" of the bottom of a rectangular rib 40, see Conrad 3:15. In effect, angle 48 of Conrad describes a longitudinal notch in an overall rectangular rib 40, 3:24. Sides 42 of rib 40 are parallel and so cannot describe a rib angle since parallel lines do not converge by definition, see Conrad 3:5-10:

> **The ribs 40 have a pair of side surfaces 42 and a bottom surface 44. The side surfaces 42 are parallel to each other and generally perpendicular to the interior belt surface 38. The bottom surface 44 is generally concave in a transverse cross-sectional view, as illustrated in FIG. 4. The most inverted point 45 is perpen-**

The ribs claimed in the present invention do not comprise a "concavity" or notch, nor do they comprise an angle with respect to a concavity or notch in a rib. At best Conrad teaches a portion of a rib having an angle of 45°, namely, a rib tip 46 see Figure 2 and Figure 4 above. 45° is near the range taught by Winninger, see ISO 9981 per previous arguments. 45° is significantly less than the range taught by the now supplanted White, which taught an angle of 60°. Hence, in light of the Conrad

notch the interpretation of the claims is shown to be overly broad and is not consistent with the rib as claimed or described in the specification.

Applicant asserts there is no motivation to combine since making a Conrad "notch" in a Winninger rib would diminish the ability of the rib to transmit power through frictional contact with a pulley. Frictional contact with a pulley puts the rib in shear. Removing material defeats that purpose by reducing rib shear strength.

> "When the Board does not explain the motivation, or the suggestion or teaching, that would have led the skilled artisan at the time of the invention to the claimed combination as a whole, we infer that the Board used hindsight to conclude that the invention was obvious. The "motivation-suggestion-teaching" requirement protects against the entry of hindsight into the obviousness analysis, a problem which § 103 was meant to confront... and thereby resist the temptation to read into the prior art the teachings of the invention in issue. *In re Kahn*, *infra*.

Hence, the combination does not teach the limitation and invention arranged as in the claim. Hindsight cannot provide that which the references do not teach.

Claims 2 and 5, 14, 17 and 29

2. Whether the rejection of claims 2 and 5, 14, 17 and 29 under 35 USC 103(a) as being unpatentable over Winninger et al and Conrad as applied to Claims 1, 13,

16 and 28, and in further view of Adifon et al (WO 99/43598) should be sustained.

Claims 2 and 5, 14, 17 and 29 are dependent.

The deficiencies of Winninger and Conrad are noted previously. Adifon makes no mention of ribs either, instead only teaching flat ropes (16), see Adifon Fig. 7. The disclosed flat ropes do not comprise nor teach nor reasonably suggest ribs.

Claims 3, 7, 15, 18-19, 21-22 and 30

3. Whether the rejection of claims 3, 7, 15, 18-19, 21-22 and 30 under 35 USC 103(a) as being unpatentable over Winninger et al, Conrad and Adifon et al, as applied to claims 2, 14 and 29, and in further view of Suhling (DE 3,934,654) and Siefert (US 3,662,596) should be sustained.

Claims 3, 7, 15, 18-19, 21-22 and 30 are dependent.

The deficiencies of Winninger, Adifon and Conrad are noted previously. As to Suhling and Seifert, Seifert only teaches a strain gage (11) in a tire cord, see Abstract. Suhling only teaches a current source (14), see Fig. 1. Neither cures the absence of the rib or rib angle of approximately 90° as suffered by Winninger, Conrad and Adifon

Claims 7 and 19

4. <u>Whether the rejection of claims 7 and 19 under 35 USC 103(a) as being unpatentable over Winninger et al, White et al, Adifon et al, Suhling and Seifert as applied to claims 3 and 15, and in further view of White, Jr. et al (US3,981,462) should be sustained</u>.

Claims 7 and 19 are dependent.

The deficiencies of Winninger, Adifon, Suhling and Seifert are noted previously. White apparently teaches that at the time White was filed the art comprised 40° ribs, see 4:65-68; and 5:61 to 6:4. During prosecution, White successfully argued that among other things 60° ribs are an improvement over the art, 5:10-28 and 6:13-30. 60° represents a 50% increase in rib angle over the existing art at the time White was filed.

<u>Claims 8-10 and 20</u>

5. <u>Whether the rejection of claims 8-10 and 20 under 35 USC 103(a) as being unpatentable over Winninger et al, Conrad, Adifon et al, Suhling and Seifert, and White as applied to claims 7 and 19, and in further view of Stork should be sustained</u>.

Claims 8-10 and 20 are dependent.

The deficiencies of Winninger, Conrad, Adifon, Suhling and Seifert are noted previously. Stork only teaches a ribbed belt, see Fig. 2, but gives no information

regarding a rib angle. The only information offered by Stork is that the ribs have "generally trapezoidal cross-sections with grooves 69 therebetween", see 7:4-5.

Claims 11 and 23

6. Whether the rejection of claims 11 and 23 under 35 USC 103(a) as being unpatentable over Winninger et al and Conrad as applied to claims 1 and 13, respectively and in further view of Siefert should be sustained.

Claims 11 and 23 are dependent.

Claims 12 and 24

7. Whether the rejection of claims 12 and 24 under 35 USC 103(a) as being unpatentable over Winninger et al and Conrad as applied to claims 1 and 13, respectively, and in further view of Suhling should be sustained.

Claims 12 and 24 are dependent.

Claims 25, 33-34 and 36-37

8. Whether the rejection of claims 25, 33-34 and 36-37 under 35 USC 103(a) as being unpatentable over Winninger et al and Conrad as applied to claims 1 and 13 and 33 respectively, and in further view of Stork should be sustained.

Claims 25, 33-34 and 36-37 are dependent.

Claim 26

9. Whether the rejection of claim 26 under 35 USC 103(a) as being unpatentable over Winninger et al and Conrad and Suhling and in further view of Seifert should be sustained.

Please see the arguments for rejection number 1 above regarding the absence of "a rib with an angle of approximately 90°". Neither Suhling nor Seifert teaches nor suggests the missing limitation.

Claims 35 and 38

10. Whether the rejection of claims 35 and 38 under 35 USC 103(a) as being unpatentable over Winninger et al, Conrad, Suhling and Seifert, as applied to claim 26, and in further view of Stork should be sustained.

Claims 35 and 38 are dependent.

II. EVEN IF THE BOARD BELIEVES, CONTRARY TO APPELLANTS' ARGUMENT THAT THE EXAMINER HAS MADE OUT A *PRIMA FACIE* CASE OF OBVIOUSNESS, THAT *PRIMA FACIE* CASE HAS BEEN REBUTTED SINCE THERE IS NO TEACHING, SUGGESTION, MOTIVATION OR APPARENT REASON TO COMBINE WINNINGER, CONRAD, ADIFON, SUHLING,

SIEFERT, WHITE AND STORK IN THE FASHION ADVANCED BY THE EXAMINER.

(a) No Teaching, Suggestion, Motivation or Apparent Reason to Combine

The Supreme Court has in *KSR* recognized that a showing of "teaching, suggestion, or motivation" to combine the prior art to meet the claimed subject matter could provide a helpful insight in determining whether the claimed subject matter is obvious under 35 USC §103(a).

As a corollary, the *KSR* Court also indicated that there must be an "apparent reason" to combine the known elements in the fashion proposed by the [Examiner]. This analysis needs to be made explicit.

A rejection based on 35 USC §103(a) must rest on a factual basis, with the facts being interpreted without a hindsight reconstruction of the invention from the prior art. Thus, in the context of the analysis under Section 103, it is not sufficient to merely identify one reference that teaches of the limitations of a claim combined with others that teach other limitations of a claim to support a rejection based on obviousness. This is because obviousness is not established by combining the basic disclosures of the prior art to produce the claimed invention absent a teaching, suggestion or "apparent reason" that the combination be made. *Interconnect Planning Corp. v. Fiel*, 227 USPQ 543, 551 (Fed. Cir. 1985); *In re Corkhill*, 226

USPQ 1005, 1009-110 (Fed. Cir. 1985); and _In re Kahn_, *infra*. The relevant analysis invokes a cornerstone principle of patent law:

> That all elements of an invention may have been old (the normal situation), or some old and some new, or all new, is ... simply irrelevant. Virtually all inventions are combinations and virtually all are combinations of old elements. _Environment Designs v. Union Oil Co. of Cal._, 218 USPQ 865, 870 (Fed. Cir. 1983) (Other citations omitted)

As the Court of Appeals for the Federal Circuit has noted, "[w]hen a rejection depends on a combination of prior art references, there must be some teaching, suggestion or motivation to combine the references." _Ecolochem, Inc. v. Southern Calif. Edison_, 56 USPQ 2d 1065, 1073 (Fed. Cir. 2000). This is because "combining prior art references without evidence of such a suggestion, teaching or motivation simply takes the inventor's disclosure as a blueprint for piecing together the prior art to defeat patentability." _Id._

Accordingly, to establish a rejection under 35 USC §103, a person of ordinary skill in the art must not only have had some motivation to combine the prior art teachings, but also some motivation to combine the prior art teachings in the particular manner claimed. See e.g. _In re Kotzab_, 55 USPQ 2d 1313, 1318 (Fed. Cir. 2000). Further, as discussed in *KSR*, citing _In re Kahn_ with approval, the Examiner must show reasons why the skilled artisan, confronted with the same problems as the inventors and with no knowledge of the claimed invention, would select the elements

from the cited prior art references for combination in the manner claimed. See also In re Rouffet *infra*.

In this case, the Examiner cites a single reference, Winninger et al., as the primary reference in support of all of the rejections under 35 USC §103(a).[2] Winninger is variously combined with Conrad, Adifon, Suhling, Siefert, White and Stork. Winninger is combined with Conrad for all rejections but for claims 7 and 19.

However, as argued above both Winninger and Conrad have a fatal defect; neither teaches nor suggests the rib angle attributed to it by the Examiner. According to the Interview, the Examiner agrees the belt rib angle of approximately 90° is not taught by Winninger. The arguments in this Brief demonstrate that none of the other references teach the claimed rib angle.

The Federal Circuit has held that the teachings are viewed as they would have been viewed by one of ordinary skill. *Kimberly-Clark v. Johnson & Johnson,* 745 F.2d 1437, 1454, 223 USPQ 603, 614 (Fed.Cir.1984); *In re Mercier,* 515 F.2d 1161, 1165, 185 USPQ 774, 778 (CCPA 1975). "It is impermissible within the framework of section 103 to pick and choose from any one reference only so much of it as will

[2] The first rejection in this Appeal cites 35 USC "102(b)", but is grouped under the claim rejection heading attributed to 35 USC 103 and the specific rejection is cast in terms of obviousness. In the office action mailed 10/03/2007 the Examiner made a 102 rejection based solely on Winninger but this was replaced with a 103 rejection with White as the secondary reference in the Office Action mailed 02/22/2008.

support a given position, to the exclusion of other parts necessary to the full appreciation of what such reference fairly suggests to one of ordinary skill in the art". *In re Wesslau,* 353 F.2d at 241, 147 USPQ at 393.

The court in *In Re Hedges* 783 F.2d 1038 (1986), when confronted with an overbroad construction of a reference concerning process temperature limits, cited *In re Rosenberger,* 386 F.2d 1015, 1018, 156 USPQ 24, 26 (CCPA 1967), "[t]his appears to be an extremely strained interpretation of the reference which could be made only by hindsight." The Rosenberger court was struggling with an argument to equate a known molding resin charge to the new a resin coating. Even though resin was present in each process, the Rosenberger court concluded they were not equivalent.

Further, the court prohibits the PTO from using the teachings of the invention to reconstruct or redesign the references. In *Application of Ratti*, the court in determined that hooks and bolts were not equivalent "connecting means" and that the invention was patentable by observing:

> "the use of the spring hooks produces a result quite different from the bolts of Chinnery et al. On the record before us no reference relied on shows any spring hooks nor does it contain any support for the contention that bolts and spring hooks are equivalents...This suggested

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Applicant's argument dated June 19, 2008 treated the 02/22/2008 rejection as a 103 rejection.

combination of references would require a substantial *reconstruction and redesign* of the elements shown in Chinnery et al. as well as a *change in the basic principles under which the Chinnery et al. construction was designed to operate.* Once appellant [patent applicant] had taught how this could be done, the redesign may, *by hindsight*, seem to be obvious to one having ordinary skills in the shaft sealing art." *Application of Ratti* 46 C.C.P.A. 976, 270 F.2d 810 (1959). (emphasis added).

Appellant respectfully argues that the Examiner is redesigning the clear teachings of Winninger by impermissibly scaling the Winninger Figures in an effort to create that which does not exist, namely, art which teaches or suggests use of a belt having a rib with a rib angle of approximately 90°. In fact, none of the cited references submitted by the Examiner or Appellant teaches or suggests a rib angle of approximately 90°. Concluding otherwise requires hindsight.

* * *

Conclusion

In light of the foregoing, it is submitted that the Examiner has failed to meet his burden of establishing a *prima facie* case of obviousness in this case. Even if the Board believes a *prima facie* case has been made out, although Appellants strongly contends to the contrary, it is submitted that Appellants have rebutted the *prima facie* case. The Board is requested to reverse the rejection of claims 1-26, 28-31, 33-38 and 43-45 under 35 USC §103(a).

Respectfully submitted,

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Reg. No. 42,183
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Denver, Colorado
Dated: June 3, 2009

CLAIMS

APPENDIX

1. (Rejected) A lift belt comprising:

an elastomeric body having a width w and a thickness t and having a pulley engaging surface;

the elastomeric body having an aspect ratio w/t that is greater than 1;

a tensile cord contained within the elastomeric body and extending longitudinally;

the pulley engaging surface having a ribbed profile extending longitudinally; and

the ribbed profile having a rib with an angle of approximately 90°.

2. (Rejected) The lift belt as in claim 1, wherein the tensile cord comprises a conductive material having a resistance.

3. (Rejected) The lift belt as in claim 2, wherein the resistance of the tensile cord varies to indicate a lifting belt load.

4. (Rejected) The lift belt as in claim 1 comprising a plurality of ribs.

5. (Rejected) The lift belt as in claim 4 having an end.

6. (Rejected) The lift belt as in claim 3 comprising a plurality of tensile cords.

7. (Rejected) The lift belt as in claim 3 further comprising:

a jacket on a surface opposite the pulley engaging surface.

8. (Rejected) The lift belt as in claim 7, wherein the jacket comprises nylon.

9. (Rejected) The lift belt as in claim 8 wherein a tensile cord comprises a metallic material.

10. (Rejected) The lift belt as in claim 9 wherein a tensile cord comprises steel.

11. (Rejected) The lift belt as in claim 1 further comprising:

an electrical circuit connected to the tensile cord for measuring a tensile cord load.

12. (Rejected) The lift belt as in claim 1 further comprising:

an electrical circuit for detecting a tensile cord failure.

13. (Rejected) An elevator lift system comprising:

a belt having an elastomeric body having a width w and a thickness t and having a pulley engaging surface;

the elastomeric body having an aspect ratio w/t that is greater than 1;

a tensile cord contained within the elastomeric body and extending longitudinally;

the pulley engaging surface having a ribbed profile extending longitudinally;

the ribbed profile having a rib with an angle of approximately 90°; and

at least one pulley having a ribbed profile engaged with the pulley engaging surface.

14. (Rejected) The lift system as in claim 13, wherein the tensile cord comprises a conductive material having a resistance.

15. (Rejected) The lift system as in claim 14, wherein the resistance of the tensile cord varies according to a lifting belt load.

16. (Rejected) The lift system as in claim 13, wherein the pulley engaging surface comprises a plurality of ribs.

17. (Rejected) The lift system as in claim 16, wherein the belt has an end.

18. (Rejected) The lift system as in claim 15 comprising a plurality of tensile cords.

19. (Rejected) The lift system as in claim 15 further comprising:

a jacket on a surface opposite the pulley engaging surface.

20. (Rejected) The lift system as in claim 19, wherein the jacket comprises nylon.

21. (Rejected) The lift system as in claim 18 wherein a tensile cord comprises a metallic material.

22. (Rejected) The lift system as in claim 21 wherein a tensile cord comprises steel.

23. (Rejected) The lift system as in claim 13 further comprising:

an electrical circuit connected to a tensile cord for measuring a tensile cord load.

24. (Rejected) The lift system as in claim 13 further comprising:

an electrical circuit for detecting a tensile cord failure.

25. (Rejected) The lift belt as in claim 1 further comprising fibers extending from the pulley engaging surface.

26. (Rejected) A lift system comprising:

a belt having an elastomeric body having a width w and a thickness t and having a pulley engaging surface;

the elastomeric body having an aspect ratio w/t that is greater than 1;

a tensile cord contained within the elastomeric body and extending longitudinally;

the pulley engaging surface having a ribbed profile extending longitudinally;

the ribbed profile having a rib with an angle of approximately 90°;

at least one pulley having a ribbed profile engaged with the pulley engaging surface; and

an electric circuit for detecting a tensile cord load and for controlling operation of the system.

27. (Withdrawn) A method of operating a lift system comprising the steps of:

training a tensile cord over a pulley between a motor and a load;

measuring an electrical resistance of the tensile cord; and

controlling an operation of the motor according to the electrical resistance.

28. (Rejected) A lift belt comprising:

an elastomeric body having a width w and a thickness t and having a pulley engaging surface;

the elastomeric body having an aspect ratio w/t that is greater than 1;

a tensile cord contained within the elastomeric body and extending longitudinally;

the pulley engaging surface having a ribbed profile; and

the ribbed profile having a rib with a rib angle of approximately 90°.

29. (Rejected) The lift belt as in claim 28, wherein the tensile cord comprises a conductive material having a resistance.

30. (Rejected) The lift belt as in claim 29, wherein the resistance of the tensile cord varies to indicate a lifting belt load.

31. (Rejected) The lift belt as in claim 28, wherein the rib angle is in the range of approximately 60° to 120°.

32. (Cancelled)

33. (Rejected) The lift belt as in claim 1 further comprising a fiber loading in the elastomeric body.

34. (Rejected) The lift belt as in claim 13 further comprising a fiber loading in the elastomeric body.

35. (Rejected) The lift belt as in claim 26 further comprising a fiber loading in the elastomeric body.

36. (Rejected) The lift belt as in claim 33, wherein the fiber loading comprises one of cellulose, aramid, polyester, cotton, nylon, carbon, acrylic, polyurethane, or glass fibers individually or in combination with two or more of the foregoing.

37. (Rejected) The lift belt as in claim 34, wherein the fiber loading comprises one of cellulose, aramid, polyester, cotton, nylon, carbon, acrylic, polyurethane, or glass fibers individually or in combination with two or more of the foregoing.

38. (Rejected) The lift belt as in claim 35, wherein the fiber loading comprises one of cellulose, aramid, polyester, cotton, nylon, carbon, acrylic, polyurethane, or glass fibers individually or in combination with two or more of the foregoing.

39. (Cancelled)

40. (Cancelled)

41. (Cancelled)

42. (Cancelled)

43. (Rejected) A lift belt comprising:

an elastomeric body having a width w and a thickness t and having a pulley engaging surface;

the elastomeric body having an aspect ratio w/t that is greater than 1;

a tensile cord contained within the elastomeric body and extending longitudinally;

the pulley engaging surface having a ribbed profile extending longitudinally along the elastomeric body; and

the ribbed profile having a rib with an angle of approximately 90°.

44. (Rejected) An elevator lift system comprising:

a belt having an elastomeric body having a width w and a thickness t and having a pulley engaging surface;

the elastomeric body having an aspect ratio w/t that is greater than 1;

a tensile cord contained within the elastomeric body and extending longitudinally;

the pulley engaging surface having a ribbed profile extending longitudinally and having a rib with an angle of approximately 90°; and

at least one pulley having a ribbed profile engaged with the pulley engaging surface.

45. (Rejected) A lift belt comprising:

an elastomeric body having a pulley engaging surface;

a tensile cord contained within the elastomeric body and extending longitudinally;

the pulley engaging surface having a ribbed profile, the ribbed profile extending longitudinally along the elastomeric body; and

the ribbed profile having a rib with a rib angle of approximately 90°.

<u>EVIDENCE</u>

<u>APPENDIX</u>

1. Interview Summary dated June 11, 2008.

2. Argument dated October 19, 2007.

Interview Summary	Application No. 10/037,427	Applicant(s) HEINZ ET AL.	
	Examiner Stefan Kruer	Art Unit 3654	

All participants (applicant, applicant's representative, PTO personnel):

(1) *Stefan Kruer*.

(2) *Jeff Thurnau*.

(3) *Peter Cuomo*.

(4) _____.

Date of Interview: *11 June 2008*.

Type: a)☐ Telephonic b)☐ Video Conference
c)☒ Personal [copy given to: 1)☐ applicant 2)☒ applicant's representative]

Exhibit shown or demonstration conducted: d)☐ Yes e)☒ No.
If Yes, brief description: _____.

Claim(s) discussed: *1,13,26,28 and 44*.

Identification of prior art discussed: *Winninger et al, White, Jr. et al, Adifon et al and McKay*.

Agreement with respect to the claims f)☐ was reached. g)☐ was not reached. h)☒ N/A.

Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: *Applicant's representative reviewed the limitation "a rib with an angle of approximately 90°" in view of the prior art of record. Upon review and discussion, the limitation appears to overcome the prior art of record. An updated search is to be done upon receipt of applicant's arguments.*.

(A fuller description, if necessary, and a copy of the amendments which the examiner agreed would render the claims allowable, if available, must be attached. Also, where no copy of the amendments that would render the claims allowable is available, a summary thereof must be attached.)

THE FORMAL WRITTEN REPLY TO THE LAST OFFICE ACTION MUST INCLUDE THE SUBSTANCE OF THE INTERVIEW. (See MPEP Section 713.04). If a reply to the last Office action has already been filed, APPLICANT IS GIVEN A NON-EXTENDABLE PERIOD OF THE LONGER OF ONE MONTH OR THIRTY DAYS FROM THIS INTERVIEW DATE, OR THE MAILING DATE OF THIS INTERVIEW SUMMARY FORM, WHICHEVER IS LATER, TO FILE A STATEMENT OF THE SUBSTANCE OF THE INTERVIEW. See Summary of Record of Interview requirements on reverse side or on attached sheet.

Peter M. Cuomo
Supervisory Patent Examiner
Technology Center 3600

Examiner Note: You must sign this form unless it is an Attachment to a signed Office action.

Examiner's signature, if required

DOCKET NO. B01-085A

I hereby certify that this correspondence is being submitted by fax transmission to 571-273-8300 on October 19, 2007 For: The Gates Corporation
Signature Tonya Fallus **Date signed:** October 19, 2007

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:		)	
	Heinz, Guenther	)	Examiner: Kruer, Stefan
		)	Group Art Unit: 3654
Serial No.:	10/037,427	)	
		)	
Filed:	01/02/2002	)	ARGUMENT
For:	Lift Belt and System	)	

Via Fax Transmission
Commissioner for Patents
Alexandria, VA 22313

Dear Examiner Kruer:

This is filed in response to the non-final office action mailed 10/03/2007.

Amendment

I. In the Drawings.

1. None.

II. In the Specification

1. None.

III. In the Claims.

1. The claims are not amended.

1. (Previously Presented) A lift belt comprising:
   an elastomeric body having a width w and a thickness t and having a pulley engaging surface;
   the elastomeric body having an aspect ratio w/t that is greater than 1;
   a tensile cord contained within the elastomeric body and extending longitudinally;
   the pulley engaging surface having a ribbed profile extending longitudinally; and
   the ribbed profile having a rib with an angle of approximately 90°.

2. (Original) The lift belt as in claim 1, wherein the tensile cord comprises a conductive material having a resistance.

3. (Original) The lift belt as in claim 2, wherein the resistance of the tensile cord varies to indicate a lifting belt load.

4. (Original) The lift belt as in claim 1 comprising a plurality of ribs.

5. (Original) The lift belt as in claim 4 having an end.

6. (Original) The lift belt as in claim 3 comprising a plurality of tensile cords.

7. (Original) The lift belt as in claim 3 further comprising:

a jacket on a surface opposite the pulley engaging surface.

8. (Original) The lift belt as in claim 7, wherein the jacket comprises nylon.

9. (Original) The lift belt as in claim 8 wherein a tensile cord comprises a metallic material.

10. (Original) The lift belt as in claim 9 wherein a tensile cord comprises steel.

11. (Previously Amended) The lift belt as in claim 1 further comprising:
an electrical circuit connected to the tensile cord for measuring a tensile cord load.

12. (Original) The lift belt as in claim 1 further comprising:
an electrical circuit for detecting a tensile cord failure.

13. (Previously Presented) An elevator lift system comprising:
a belt having an elastomeric body having a width w and a thickness t and having a pulley engaging surface;
the elastomeric body having an aspect ratio w/t that is greater than 1;
a tensile cord contained within the elastomeric body and extending longitudinally;
the pulley engaging surface having a ribbed profile extending longitudinally;
the ribbed profile having a rib with an angle of approximately 90°; and

at least one pulley having a ribbed profile engaged with the pulley engaging surface.

14. (Original) The lift system as in claim 13, wherein the tensile cord comprises a conductive material having a resistance.

15. (Original) The lift system as in claim 14, wherein the resistance of the tensile cord varies according to a lifting belt load.

16. (Original) The lift system as in claim 13, wherein the pulley engaging surface comprises a plurality of ribs.

17. (Original) The lift system as in claim 16, wherein the belt has an end.

18. (Original) The lift system as in claim 15 comprising a plurality of tensile cords.

19. (Original) The lift system as in claim 15 further comprising:
a jacket on a surface opposite the pulley engaging surface.

20. (Original) The lift system as in claim 19, wherein the jacket comprises nylon.

21. (Original) The lift system as in claim 18 wherein a tensile cord comprises a metallic material.

22. (Original) The lift system as in claim 21 wherein a tensile cord comprises steel.

23. (Original) The lift system as in claim 13 further comprising:

an electrical circuit connected to a tensile cord for measuring a tensile cord load.

24. (Original) The lift system as in claim 13 further comprising:

an electrical circuit for detecting a tensile cord failure.

25. (Original) The lift belt as in claim 1 further comprising fibers extending from the pulley engaging surface.

26. (Previously Presented) A lift system comprising:

a belt having an elastomeric body having a width w and a thickness t and having a pulley engaging surface;

the elastomeric body having an aspect ratio w/t that is greater than 1;

a tensile cord contained within the elastomeric body and extending longitudinally;

the pulley engaging surface having a ribbed profile extending longitudinally;

the ribbed profile having a rib with an angle of approximately 90°;

at least one pulley having a ribbed profile engaged with the pulley engaging surface; and

an electric circuit for detecting a tensile cord load and for controlling operation of the system.

27. (Previously Withdrawn) A method of operating a lift system comprising the steps of:

training a tensile cord over a pulley between a motor and a load;

measuring an electrical resistance of the tensile cord; and

controlling an operation of the motor according to the electrical resistance.

28. (Previously Presented) A lift belt comprising:

an elastomeric body having a width w and a thickness t and having a pulley engaging surface;

the elastomeric body having an aspect ratio w/t that is greater than 1;

a tensile cord contained within the elastomeric body and extending longitudinally;

the pulley engaging surface having a ribbed profile; and

the ribbed profile having a rib with a rib angle of approximately 90°.

29. (Original) The lift belt as in claim 28, wherein the tensile cord comprises a conductive material having a resistance.

30. (Original) The lift belt as in claim 29, wherein the resistance of the tensile cord varies to indicate a lifting belt load.

31. (Original) The lift belt as in claim 28, wherein the rib angle is in the range of approximately 60° to 120°.

32. (Previously Cancelled) ~~The lift belt as in claim 28, wherein the rib angle is approximately 90°.~~

33. (Previously Added) The lift belt as in claim 1 further comprising a fiber loading in the elastomeric body.

34. (Previously Added) The lift belt as in claim 13 further comprising a fiber loading in the elastomeric body.

35. (Previously Added) The lift belt as in claim 26 further comprising a fiber loading in the elastomeric body.

36. (Previously Added) The lift belt as in claim 33, wherein the fiber loading comprises one of cellulose, aramid, polyester, cotton, nylon, carbon, acrylic, polyurethane, or glass fibers individually or in combination with two or more of the foregoing.

37. (Previously Added) The lift belt as in claim 34, wherein the fiber loading comprises one of cellulose, aramid, polyester, cotton, nylon, carbon, acrylic, polyurethane, or glass fibers individually or in combination with two or more of the foregoing.

38. (Previously Added) The lift belt as in claim 35, wherein the fiber loading comprises one of cellulose, aramid, polyester, cotton, nylon, carbon, acrylic, polyurethane, or glass fibers individually or in combination with two or more of the foregoing.

39. (Previously Cancelled) ~~A lift belt comprising:~~

~~an elastomeric body having a width w and a thickness t and having a pulley engaging surface;~~

~~the elastomeric body having an aspect ratio w/t that is greater than 1;~~

~~a tensile cord contained within the elastomeric body and extending longitudinally;~~

~~the pulley engaging surface having a ribbed profile; and,~~

~~the ribbed profile having a rib with an angle in the range of approximately 60° to approximately 120°.~~

40. (Previously Cancelled) ~~The lift belt as in claim 39 further comprising a fiber loading in the elastomeric body.~~

41. (Previously Cancelled) ~~The lift belt as in claim 40, wherein the fiber loading comprises one of cellulose, aramid, polyester, cotton, nylon, carbon, acrylic, polyurethane, or glass fibers individually or in combination with two or more of the foregoing.~~

42. (Previously Cancelled) ~~The lift belt as in claim 39, wherein the angle is approximately 90°.~~

43. (Previously Presented) A lift belt comprising:

an elastomeric body having a width w and a thickness t and having a pulley engaging surface;

the elastomeric body having an aspect ratio w/t that is greater than 1;

a tensile cord contained within the elastomeric body and extending longitudinally;

the pulley engaging surface having a ribbed profile extending longitudinally along the elastomeric body; and

the ribbed profile having a rib with an angle of approximately 90°.

44. (Previously Presented) An elevator lift system comprising:

a belt having an elastomeric body having a width w and a thickness t and having a pulley engaging surface;

the elastomeric body having an aspect ratio w/t that is greater than 1;

a tensile cord contained within the elastomeric body and extending longitudinally;

the pulley engaging surface having a ribbed profile extending longitudinally and having a rib with an angle of approximately 90°; and

at least one pulley having a ribbed profile engaged with the pulley engaging surface.

45. (Previously Presented) A lift belt comprising:

an elastomeric body having a pulley engaging surface;

a tensile cord contained within the elastomeric body and extending longitudinally;

the pulley engaging surface having a ribbed profile, the ribbed profile extending longitudinally along the elastomeric body; and

the ribbed profile having a rib with a rib angle of approximately 90°.

IV. Remarks.

The Examiner entered the following rejections.

1. Claims 1, 4, 6, 13, 16, 28, 31 and 43-45 are rejected under 35 USC 102(b) as being anticipated by Winninger et al (US 6,033,331).

As to claims 1, 13, 28, 43 and 45 in the office action the Examiner notes that the abbreviated copy of the ISO standard provided by Applicant in the prior response did not include the referenced characters of standard dimensions designated H, J, K, L and M by Winninger et al, nor did Winninger disclose a date of issue or numbered edition of the ISO standard.[1] Consequently, the Examiner concluded that a written disclosure of "a definitive angle with respect to the disclosure of Winninger et al, *other than as depicted*, is not realized".[2] Absent this information, in order to support the 102(b) rejection the Examiner appears to rely solely on Winninger Fig. 1 as depicted to teach the limitation directed to "the ribbed profile having a rib with an angle of approximately 90°".[3]

Regarding the sufficiency of prior art references in support of a 102(b) rejection, the court in Amgen, Inc. v. Hoechst Marion Roussel, Inc., 314 F.3d 1313 (Fed.Cir.2003) stated that:

> "In patent prosecution the examiner is entitled to reject application claims as anticipated by a prior art patent without conducting an inquiry into whether or not that patent is enabled or whether or not it is the claimed material (as opposed to the unclaimed disclosures) in that patent that are at issue. *In re Sasse*, 629 F.2d 675, 681, 207 USPQ 107, 111 (C.C.P.A.1980) ("[W]hen the PTO cited a disclosure which expressly anticipated the present invention ... the burden was shifted to the applicant. He had to rebut the presumption of the operability of [the prior art patent] by a preponderance of the evidence."(citation omitted)). *The applicant, however, can then overcome that rejection by proving that the relevant disclosures of the prior art patent are not enabled.*" (emphasis added).

In particular, the court in *Sasse* observed:

> "...the proper test of a description in a publication as a bar to a patent as the clause is used in section 102(b) requires a determination of whether one skilled in the art to which the invention pertains could take the description of the invention in the printed publication and combine it with his own knowledge of the particular art and from this combination be put in possession of the invention on which a patent is sought. *Unless this condition prevails, the description in the printed publication is*

[1] The ISO standards actually refer to profiles PH, PJ, PK, PL and PM while Winninger specifies profiles "H, J, K, L and M" (3:36), which Applicant is willing to presume refers to the ISO standards for the sake of this argument.

[2] This alone may be fatal to Winninger as a 102(b) reference since it suggests that Winninger on its face does not enable the claimed rib angle.

[3] Applicant notes that Winninger was originally presented as a secondary reference for a 35 USC 103(a) rejection presented in a prior office action mailed 02/23/2007.

inadequate as a statutory bar to patentability under section 102(b)." (emphasis added).[4]

In the instant case the law does not support the Examiner's reliance on Fig. 1 to teach the missing rib angle information. Fig. 1 simply does not teach any rib angle. Fig. 1 cannot be scaled.

As to the written disclosure, the inventor Winninger was careful to specify various particular belt dimensions, including "P" (pitch at 3:34), "L" (belt width at 3:48), "d" (twisted strand width 5:12 and Fig. 1) and "e" (distance between strands 5:12 and Fig. 1)[5]. Given the choice Winninger did not specify any angles in the specification, and instead specifically chose to rely on an extrinsic source to provide other apparently less relevant information such as angles, namely, see US 6,033,331 referring to ISO 9981 at 3:36-37.

Attached to this paper is the full copy of ISO 9981. Table 1 on page 3 discloses the only relevant angle as noted in Applicant's earlier filed arguments, i.e., groove angle 40°.[6]

---

[4] It is illustrative to touch on the prosecution requirements relating to 35 USC 112. It is well established that absent full, clear and exact disclosure in the specification, the examiner cannot rely on the drawings alone to supply missing information, and in particular incomplete drawings. The court in *In Re Olson*, 41 CCPA 871, 212 F.2d 590 (1954) stated:

> "Ordinarily drawings which accompany an application for a patent are merely illustrative of the principles embodied in the alleged invention claimed therein and do not define the precise proportions of elements relied upon to endow the claims with patentability. In re Kinderman, 178 F.2d 937, 37 C.C.P.A., Patents, 800. See also In re Betz, 166 F.2d 831, 35 C.C.P.A., Patents, 1033; Wasberg v. Ditchfield, 155 F.2d 408, 33 C.C.P.A., Patents, 1099. Accordingly, the board in refusing to accept appellant's affidavit and the proposed amendments of his specification properly held:
>
> 'The statement as to the particular spatial relationship between the parts included in these claims, which is objected to by the Examiner, is not clearly shown in the drawing and there is nothing in the drawing which definitely supports appellant's contention. *It is well known that Patent Office drawings are not normally drawn to scale, with the dimensions and sizes of parts shown to exact measurements as are shop drawings.* In the particular case under consideration, the distances and dimensions involved are of the order of a few thousandths of an inch and *it appears obvious that the drawing alone cannot be scaled off*, under these circumstances, *to show that any particular distances or sizes are exactly equal when the specification is completely silent in this respect.* For this reason, we do not consider that appellant's drawing supports the position he has taken in respect thereto and we will affirm the Examiner's rejection of these claims as drawn to new matter.'" (emphasis added).

Olson concerned the propriety of using only the drawings to attempt to establish that ball centering means were equally spaced from the valve seats, given this limitation was not disclosed at all in the original specification. In fact, the drawings were incomplete so that even in the face of material which the court believed was patentable, the *Olson* court upheld the Board's rejection of all claims for lack of disclosure.

[5] In fact, "P" and "L" relate to the "teeth 23" (ribs). Applicant addressed the meaning of "ribs" and "teeth" in a prior paper.

[6] Again, this source is at best somewhat ambiguous since ISO 9981 refers to a "groove" angle in Table 1. Applicant is willing to accept that pulley groove angle can equal belt rib angle solely for the purposes of this

As to the relevant date of ISO 9981, page ii states:

> "This second edition cancels and replaces the first edition (ISO 9981:1990), which has been technically revised. In particular, a subclause on the tolerances on the diameters over balls (3.3.4) has been added."

Hence, the ISO standard in effect at the time Winninger was filed (Sep. 19, 1997) was ISO 9981:1990. The only change from the 1990 version to the 1998 version was made to section 3.3.4 which does not alter the disclosed angle in Table 1. Hence ISO 9981 only discloses a groove (rib) angle of 40°.

Page 1, section "1 Scope" of ISO 9981 states that:

> "The complete array of V-ribbed belts and pulleys of PH, PJ, PK, PL and PM profile for industrial and other non-automotive applications is the subject of ISO 9982. PK belt profile dimensions and tolerances are the same in both International Standards."

As to ISO 9982:1998, the standard in effect in 1997 was ISO 9982:1991. Page ii states:

> "This second edition cancels and replaces the first edition (ISO 9982:1991), which has been technically revised. In particular, one subclause on the diameters over balls and another on the manufacturing tolerances for effective lengths of V-ribbed belts have been added."

Hence, the ISO 9982 standard in effect at the time Winninger was filed was ISO 9982:1991. The only changes between the first edition 1991 and second edition 1998 are noted above, which do not include changes to groove (rib) angles.

As so, as to groove (rib) angles for profiles PH, PJ, PK, PL and PM profiles the pulley groove angle is listed as 40°, see Table 1, page 3. Each rib on a ribbed belt engages a pulley groove, and so presumably has a like angle for the sake of this argument, see 1 Scope on page 1, ISO 9982. Both ISO standards specify a groove angle of 40° which Applicant asserts for the purpose of argument may correspond to a belt rib angle of 40°. No other angles are disclosed. The tolerance range for the groove angle in Table 1 for both ISO standards is ±0.5°.

Consequently, at best Winninger enables a groove (rib) angle in the range of 39.5° to 40.5°. Winninger fails to anticipate the noted claims because it does not enable use of the claimed rib angle of approximately 90°.

The remaining claims are dependent. Applicant requests that the application be passed to allowance.

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argument. Nonetheless, ISO 9981 does not refer to belt "rib" angles at all, which further casts doubt on the capacity of the ISO standards to enable the claimed rib angle limitation of 90°.

2. Claims 2 and 5, 14, 17 and 29 are rejected under 35 USC 103(a) as being unpatentable over Winninger et al in view of Adifon et al (WO 99/43598).

Each of the noted claims are dependent.

3. Claims 3, 15, 18, 21-22 and 30 are rejected under 35 USC 103(a) as being unpatentable over Winninger et al in view of Adifon, as applied to claims 2, 14 and 29, and in further view of Suhling (DE 3,934,654) and Siefert (US 3,662,596).

Each of the noted claims are dependent.

4. Claim 19 is rejected under 35 USC 103(a) as being unpatentable over Winninger et al in view of Adifon et al in view of Suhling and Seifert, as applied to claim 15, and in further view of White, Jr. et al.

The noted claim is dependent.

5. Claim 20 is rejected under 35 USC 103(a) as being unpatentable over Winninger et al in view of Adifon et al, Suhling and Seifert and White, Jr. et al as applied to claim 19, and in further view of Stork (US 3,948,113).

The noted claim is dependent.

6. Claim 7 is rejected under 35 USC 103(a) as being unpatentable over Winninger et al in view of Adifon et al, as applied to claim 2 and in further view of White Jr. et al.

The noted claim is dependent.

7. Claims 8-10 are rejected under 35 USC 103(a) as being unpatentable over Winninger et al in view of Adifon et al and White Jr et al, as applied to claim 7, and in further view of Stork.

Each of the noted claims are dependent.

8. Claims 11 and 23 are rejected under 35 USC 103(a) as being unpatentable over of Winninger et al in view of Siefert.

Each of the noted claims are dependent.

9. Claims 12 and 24 are rejected under 35 USC 103(a) as being unpatentable over Winninger et al, in view of Suhling.

Each of the noted claims are dependent.

10. Claims 25, 33-34 and 36-37 are rejected under 35 USC 103(a) as being unpatentable over Winninger et al in view of Stork.

Each of the noted claims are dependent.

11. Claim 26 is rejected under 35 USC 103(a) as being unpatentable over Winninger et al in view of Suhling and further view of Stork.

The noted claim is dependent.

12. Claims 35 and 38 are rejected under 35 USC 103(a) as being unpatentable over Winninger et al, Suhling and Seifert, as applied to claim 26, and in further view of Stork.

Each of the noted claims are dependent.

13. Claims 1-2, 4-5, 13-14, 16, 17, 28-29, 31 and 43-45 are rejected under 35 USC 103(a) as being unpatentable over Adifon et al (WO 99/43598) in view of McKay (US 2,221,984).

A rejection based on 35 U.S.C. § 103 must rest on a factual basis, with the facts being interpreted without a hindsight reconstruction of the invention from the prior art. Thus, in the context of an analysis under § 103, it is not sufficient merely to identify one reference that teaches several of the limitations of a claim and another that teaches several limitations of a claim to support a rejection based on obviousness. This is because obviousness is not established by combining the basic disclosures of the prior art to produce the claimed invention absent a teaching or suggestion that the combination be made. Interconnect Planning Corp. v. Fiel, 774 F.2d 1132, 1143, 227 U.S.P.Q. (BNA) 543, 551 (Fed.Cir. 1985); In Re Corkhill, 771 F.2d 1496, 1501-02, 226 U.S.P.Q. (BNA) 1005, 1009-10 (Fed.Cir. 1985). The relevant analysis invokes a cornerstone principle of patent law:

> That all elements of an invention may have been old (the normal situation), or some old and some new, or all new, is . . . simply irrelevant. Virtually all inventions are combinations and virtually all are combinations of old elements. Environmental Designs v. Union Oil Co. of Cal., 713 F.2d 693, 698 (Fed.Cir. 1983) (other citations omitted).
>
> ***
>
> A patentable invention . . . may result even if the inventor has, in effect, merely combined features, old in the art, for their known purpose without producing anything beyond the results inherent in their use. American Hoist & Derek Co. v. Sowa & Sons, Inc., 220 U.S.P.Q.

(BNA) 763, 771 (Fed.Cir. 1984) (emphasis in original, other citations omitted).

As the Court of Appeals for the Federal Circuit recently noted, "[w]hen a rejection depends upon a combination of prior art references, there must be some teaching, suggestion, or motivation to combine the references." Ecolochem, Inc. v. Southern Calif. Edison, 56 U.S.P.Q. 2d 1065, 1073 (Fed.Cir. 2000). There must be a rigorous application of the requirement for a showing of the teaching or motivation to combine prior art references. In re Dembiczak, 175 F.3d 994, 999 (Fed.Cir. 1999). This is because "combining prior art references without evidence of such a suggestion, teaching, or motivation simply takes the inventor's disclosure as a blueprint for piecing together the prior art to defeat patentability." Id. Accordingly, to establish a rejection under 35 U.S.C. § 103, a person of ordinary skill in the art must not only have had some motivation to combine the prior art teachings, but also some motivation to combine the prior art teachings in the particular manner claimed. See, e.g., In re Kotzab, 217 F.3d 1365, 1371 (Fed.Cir. 2000). In other words, the Examiner must show reasons that the skilled artisan, confronted with the same problems as the inventor and with no knowledge of the claimed invention, would select the elements from the cited prior art references for combination in the manner claimed. In re Rouffet, 149 F.3d 1350, 1357 (Fed.Cir. 1998).

The references do not teach all of the claim limitations and hence there is no incentive to combine the references. In particular, as to independent claims 1, 13, 28, 43 and 45 it is easily established that Adifon makes no mention of ribs, instead only teaching *flat* ropes (16), see WO '598 page 4, line 20. The disclosed flat ropes do not comprise nor teach nor reasonably suggest ribs. Ribs are simply not present nor implied. Adifon fails as a primary reference.

McKay does not teach nor reasonably imply the claimed rib angle. Although McKay cites "ribs 12", the specific disclosure cited by the Examiner (Pg. 2, lines 35-49) simply does not specify a rib angle, but instead only refers generally to "pyramidal recesses" or "depressions", at line 41. The term "pyramidal" in no way teaches a rib angle range of approximately 90° since a pyramid may have very "steep" sides, as in an obelisk, or be very "flat" having extremely divergent sides such as with a very wide base and minimal height. As argued for the rejection in rejection no. 1 above, the figures in McKay cannot be "scaled" to reach the desired rib angle, nor do any of the figures otherwise specify a rib angle.[7] Lastly, and unlike Winninger, McKay does not incorporate any other source to provide any "rib" angle information at all. Consequently, the combination does not enable the limitation

[7] McKay also fails as a 102(b) reference for the reasons argued in rejection no. 1 above, namely, McKay does not enable the claimed invention because the specification does not disclose a rib angle, and it is not appropriate to scale the McKay figures.

directed to "the ribbed profile having a rib with an angle of approximately 90°".

The remaining claims are dependent. Applicant requests that the application be passed to allowance.

V. Fees

Any fees payable for this response may be deducted from deposit account 07-0475 in the name of The Gates Corporation.

Thank you for your attention to this case.

Sincerely,

Jeffrey Thurnau

Date: Oct. 19, 2007

Jeffrey Thurnau
Attorney for Applicant
Reg. No. 42,183
303-744-4743

INTERNATIONAL
STANDARD

ISO 9982

Second edition
1998-06-15

Belt drives — Pulleys and V-ribbed belts for industrial applications — PH, PJ, PK, PL and PM profiles: Dimensions

Transmissions par courroies — Poulies et courroies striées pour des applications industrielles — Profils PH, PJ, PK, PL et PM: Dimensions

Reference number
ISO 9982:1998(E)

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 9982 was prepared by Technical Committee ISO/TC 41, *Pulleys and belts (including veebelts)*, Subcommittee SC 1, *Veebelts and grooved pulleys*.

This second edition cancels and replaces the first edition (ISO 9982:1991), which has been technically revised. In particular, one subclause on the diameters over balls and another on the manufacturing tolerances for effective lengths of V-ribbed belts have been added.

Annex A of this International Standard is for information only.

International Organization for Standardization
Case postale 56 • CH-1211 Genève 20 • Switzerland
Internet iso@iso.ch
Printed in Switzerland

Introduction

A V-ribbed belt drive is composed of an endless belt with a longitudinally ribbed traction surface which engages and grips, by friction, pulley grooves of similar shape. The belt ribbed surface fits the pulley grooves to make nearly total contact.

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Belt drives — Pulleys and V-ribbed belts for industrial applications — PH, PJ, PK, PL and PM profiles: Dimensions

1 Scope

This International Standard specifies the principal dimensional characteristics of V-ribbed pulley groove profiles, together with the corresponding endless V-ribbed belts, of PH, PJ, PK, PL and PM profiles which are used for general industrial applications.

The PK belt was originally established for automotive accessory drive applications and ISO 9981 deals specifically with that particular field.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of the publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 254:1998, *Belts drives — Pulleys — Quality, finish and balance.*

ISO 4287:1997, *Geometrical product specification (GPS) — Surface texture: Profile method — Terms, definitions and surface texture parameters.*

3 Pulleys

3.1 Groove dimensions and tolerances

The groove dimensions of PH, PJ, PK, PL and PM belts are shown in figures 1 and 2, and given in table 1.

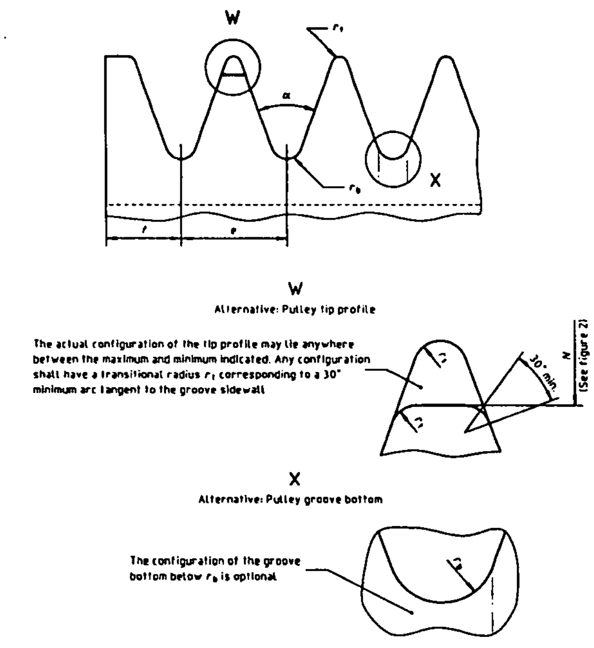
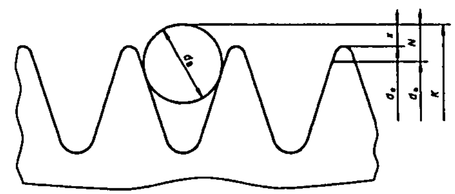


Figure 1 — Cross-section of pulley grooves



d_e = effective diameter
d_o = outer diameter
K = diameter over balls or rods
d_B = checking ball or rod diameter

Figure 2 — Pulley diameters

Table 1 — Dimensions of pulley grooves

Dimensions in millimetres

Profile		PH	PJ	PK	PL	PM
Groove pitch, e [1) 2)]		1,6 ± 0,03	2,34 ± 0,03	3,56 ± 0,05	4,7 ± 0,05	9,4 ± 0,08
Groove angle, α [3)]	± 0,5°	40°	40°	40°	40°	40°
r_t	min.	0,15	0,2	0,25	0,4	0,75
r_b	max.	0,3	0,4	0,5	0,4	0,75
Checking ball or rod diameter, d_B	± 0,01	1	1,5	2,5	3,5	7
$2x$	nom.	0,11	0,23	0,99	2,36	4,53
$2N$ [4)]	max.	0,69	0,81	1,68	3,5	5,92
f	min.	1,3	1,8	2,5	3,3	6,4

1) The tolerance on e applies to the distance between the axes of two consecutive grooves.

2) The sum of all deviations from the nominal value e for all grooves in any pulley shall not exceed ± 0,3.

3) The centreline of the groove shall make an angle of 90° ± 0,5° with the axis of the pulley.

4) N is not related to the nominal diameter of the pulley but is measured from the actual ride position of the ball or rod in the pulley.

3.2 Minimum effective diameter

The minimum recommended effective diameter, d_e, for V-ribbed pulleys is given in table 2.

Table 2 — Minimum effective diameter

Dimensions in millimetres

Profile		PH	PJ	PK	PL	PM
Effective diameter, d_e	min.	13	20	45	75	180

3.3 Tolerances on finished pulley

3.3.1 Checking conditions

Profile, diameter and run-out tolerances shall be checked on the finished pulley without surface coating.

3.3.2 Groove-to-groove diameter tolerances

The variation in diameters between the grooves in any one pulley shall be within the limits given in table 3. This variation is obtained by comparing the diameter over balls or rods.

Table 3 — Groove-to-groove diameter variation

Dimensions in millimetres

Effective diameter, d_e	Number of grooves, n	Maximum diameter variation
$d_e \leq 74$	$n \leq 6$	0,1
	$n > 6$	Add 0,003 for each additional groove
$74 < d_e \leq 500$	$n \leq 10$	0,15
	$n > 10$	Add 0,005 for each additional groove
$d_e > 500$	$n \leq 10$	0,25
	$n > 10$	Add 0,01 for each additional groove

3.3.3 Radial circular run-out

Radial circular run-out shall be within the limits given in table 4. Radial run-out measured with a ball mounted under spring pressure to ensure contact with the groove as the pulley is rotated.

Table 4 — Radial run-out

Dimensions in millimetres

Effective diameter, d_e	FIM [1)] max.
$d_e \leq 74$	0,13
$74 < d_e \leq 250$	0,25
$d_e > 250$	0,25 + 0,000 4 per millimetre of effective diameter over 250

1) Full indicator movement.

3.3.4 Axial circular run-out

Axial circular run-out (full indicator movement) shall be within 0,002 mm per millimetre of effective diameter. Run-out is measured with a ball mounted under spring pressure to ensure contact with the groove as the pulley is rotated.

3.3.5 Diameter over balls

The tolerances on the diameter over balls (K) shall be within the limits given in table 5.

Table 5 — Tolerance on the diameter over balls

Dimensions in millimetres

Diameter over balls, K	Tolerance
$K \leq 75$	± 0,3
$75 < K \leq 200$	± 0,6
For each additional 25 mm, add	± 0,1

3.3.6 Groove finish

The pulley grooves shall have a surface roughness $R_a \leq 3{,}2$ µm. See ISO 254 and ISO 4287 for definitions and the method of measurement.

3.4 Pitch diameter, d_p

The fit of a V-ribbed belt in the corresponding pulley is shown in figure 3. The true pitch diameter of a V-ribbed pulley is slightly larger than the effective diameter and its exact value is determined with the particular belt being used.

The appropriate nominal value of the effective line differential b_e, which is:

0,8 mm for the PH profile,

1,2 mm for the PJ profile,

2 mm for the PK profile,

3 mm for the PL profile, and

4 mm for the PM profile;

may be used to calculate the speed ratio. If more precision is required, the belt manufacturer should be consulted.

Further information is given in ISO 8370.

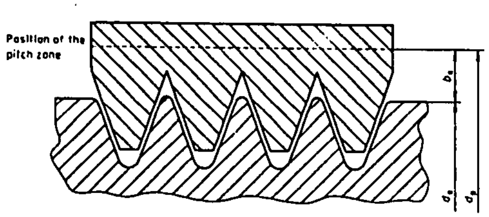


Figure 3 — Determination of pitch diameter

3.5 Designation of pulleys

A V-ribbed pulley is characterized by the number of grooves, the profile and the effective diameter. It is designated by a series of numbers and letters as follows:

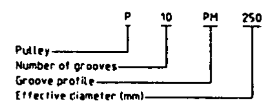
a) the first letter "P" means "Pulley";

b) the first set of numbers indicates the number of grooves;

c) the second set of letters indicates the groove profile;

d) the second set of numbers indicates the effective diameter, in millimetres.

EXAMPLE



4 Belts

4.1 Belt dimensions

The belt dimensions are shown on figure 4, and given in table 6.

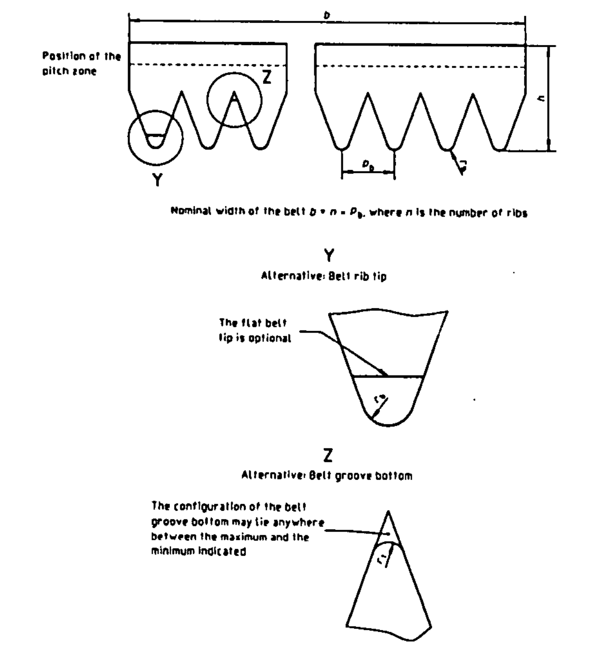


Figure 4 — Cross-section of belt

Table 6 — Belt dimensions

Dimensions in millimetres

Profile		PH	PJ	PK	PL	PM
Rib pitch, p_b		1,6	2,34	3,56	4,7	9,4
r_b	min.	0,3	0,4	0,5	0,4	0,75
r_t	max.	0,15	0,2	0,25	0,4	0,75
Belt height, h	≈	3	4	6	10	17

NOTE — Belt rib pitch and belt height are shown as reference dimensions only. Cumulative rib pitch tolerance is an important value, however, it is frequently affected by the tension at which the belt operates and the modulus of the tension member.

4.2 Measurement of effective belt length

4.2.1 Measuring fixture (see figure 5)

The effective belt length shall be determined by placing the belt on a measuring fixture composed of the following elements.

4.2.1.1 Two pulleys of equal diameter, one of which is fixed and the other movable.

Their profile shall comply with figure 1 and table 1, and their recommended effective diameter shall be determined from the values given in table 7.

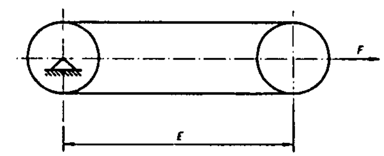


Figure 5 — Measuring fixture to determine effective length

Table 7 — Measuring pulleys and measuring forces

Dimensions in millimetres and measuring forces in newtons

Profile		PH		PJ		PK	PL	PM
Pulley effective circumference (at the level of effective diameter), U_e		100	300	100	300	300	500	800
Diameter over balls or rods, K	± 0,13	31,94	95,6	32,06	95,72	98,48	181,51	259,17
Measuring force per rib, F		30		50		100	200	450

4.2.1.2 Device for applying a total measuring face to the movable pulley.

4.2.1.3 Device for measuring the centre distance between the two pulleys.

4.2.2 Measuring force

The measuring force to be applied for measuring the effective length of belts is given in table 7.

4.2.3 Procedure

To measure the effective length of a belt, rotate the belt at least two revolutions to seat it properly and to divide the total force equally between the two strands of the belt.

Then measure the centre distance between the pulleys, E, and calculate the effective length, L_e, of the belt using the following formula:

$$L_e = E_{max} + E_{min} + U_e$$

where

U_e is the effective circumference of the measuring pulleys;

E_{max} is the maximum centre distance between the pulleys;

E_{min} is the minimum centre distance between the pulleys.

4.2.4 Manufacturing tolerances

The permissible manufacturing tolerances for effective lengths of V-ribbed belts are given in table 8.

The tolerances for table 8 are approximately calculated using the equations given below. The values for L_e in the equation are the maximum for the range and the results are rounded to reasonable values.

$$+0{,}3\sqrt[3]{L_e} + 0{,}003\,L_e$$

$$-2 \times \left(0{,}3\sqrt[3]{L_e} + 0{,}003\,L_e\right)$$

Table 8 — Manufacturing tolerances for effective lengths of V-ribbed belts

Dimensions and tolerances in millimetres

Effective length L_e	Permissible deviation for profiles PH	PJ	PK	PL	PM
$200 < L_e \leq 500$	+4 −8	+4 −8	+4 −8		
$500 < L_e \leq 750$	+5 −10	+5 −10	+5 −10		
$750 < L_e \leq 1\,000$	+6 −12	+6 −12	+6 −12	+6 −12	
$1\,000 < L_e \leq 1\,500$	+8 −16	+8 −16	+8 −16	+8 −16	
$1\,500 < L_e \leq 2\,000$	+10 −20	+10 −20	+10 −20	+10 −20	
$2\,000 < L_e \leq 3\,000$	+12 −24	+12 −24	+12 −24	+12 −24	+12 −24
$3\,000 < L_e \leq 4\,000$				+15 −30	+15 −30
$4\,000 < L_e \leq 6\,000$				+20 −40	+20 −40
$6\,000 < L_e \leq 8\,000$				+30 −60	+30 −60
$8\,000 < L_e \leq 12\,500$					+45 −90
$12\,500 < L_e \leq 17\,000$					+60 −120

4.3 Designation of belts

A V-ribbed belt is characterized by the number of belt ribs, the profile and the effective length. It is designated by a series of numbers and letters as follows:

a) the first set of numbers indicates the number of belt ribs;

b) the letters indicate the belt profile;

c) the second set of numbers indicates the effective length, in millimetres.

EXAMPLE

10 PM 3 550

Number of belt ribs — 10
Belt profile — PM
Effective length (mm) — 3 550

Annex A
(informative)

Bibliography

[1] ISO 8370-2:1993, *Belt drives — Dynamic test to determine pitch zone location — Part 2: V-ribbed belts.*

[2] ISO 9981:1998, *Belt drives — Pulleys and V-ribbed belts for the automotive industry — PK profile: Dimensions.*

ICS 21.220.10

Descriptors: belt drives, pulleys, grooved pulleys, power transmission belts, V-belts, form specifications, dimensions, designation.

Price based on 11 pages

INTERNATIONAL STANDARD

ISO 9981

Second edition
1998-11-01

Belt drives — Pulleys and V-ribbed belts for the automotive industry — PK profile: Dimensions

Transmissions par courroies — Poulies et courroies striées pour la construction automobile — Profil PK: Dimensions

Reference number
ISO 9981:1998(E)

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 9981 was prepared by Technical Committee ISO/TC 41, *Pulleys and belts (including veebelts)*, Subcommittee SC 1, *Veebelts and grooved pulleys*.

This second edition cancels and replaces the first edition (ISO 9981:1990), which has been technically revised. In particular, a subclause on the tolerances on the diameters over balls (3.3.4) has been added.

Annex A of this International Standard is for information only.

Introduction

A V-ribbed belt drive is composed of an endless belt with a longitudinally ribbed traction surface which engages and grips, by friction, pulley grooves of similar shape. The belt ribbed surface fits the pulley grooves to make nearly total contact.

Belt drives — Pulleys and V-ribbed belts for the automotive industry — PK profile: Dimensions

1 Scope

This International Standard specifies the principal dimensional characteristics of V-ribbed pulley groove profiles, together with the corresponding endless V-ribbed belts of PK profile which are used predominantly for automotive accessory drive applications.

The complete array of V-ribbed belts and pulleys of PH, PJ, PK, PL and PM profile for industrial and other non-automotive applications is the subject of ISO 9982. PK belt profile dimensions and tolerances are the same in both International Standards.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of the publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on the International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 254:1998, *Belt drives — Pulleys — Quality, finish and balance.*

ISO 4287:1997, *Geometrical product specification (GPS) — Surface texture: Profile method — Terms, definitions and surface texture parameters.*

3 Pulleys

3.1 Groove dimensions and tolerances

The groove dimensions of PK pulleys are shown in figures 1 and 2, and given in table 1.

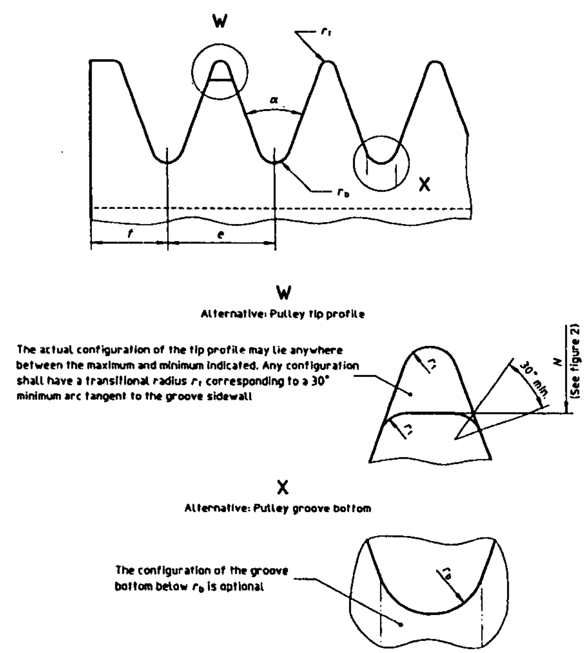
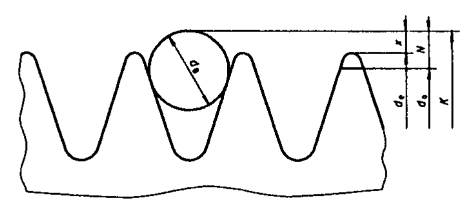


Figure 1 — Cross-section of pulley grooves



d_e = effective diameter
d_o = outer diameter
K = diameter over balls or rods
d_B = checking ball or rod diameter

Figure 2 — Pulley diameters

Table 1 — Dimensions of PK pulley grooves

Dimensions in millimetres

Groove pitch, e	± 0,05 1) 2)	3,56
Groove angle, α 3), for measuring	± 0° 15′	40°
Groove angle, α 3), for testing and actual use	± 1°	40°
r_t	min.	0,25
r_b	max.	0,5
Checking ball or rod diameter, d_B	± 0,01	2,5
$2x$	nom.	0,99
$2N$ 4)	max.	1,68
f	min.	2,5

1) The tolerance on e applies to the distance between the axes of two consecutive grooves.

2) The sum of all deviations from the nominal value e for all grooves in any one pulley shall not exceed ± 0,3.

3) The centreline of the groove shall make an angle of 90° ± 0,5° with the axis of the pulley.

4) N is not related to the nominal diameter of the pulley but is measured from the actual ride position of the ball or rod in the pulley.

3.2 Minimum effective diameter

The minimum recommended effective diameter, d_e, for PK pulleys is 45 mm.

3.3 Tolerances on finished pulley

3.3.1 Checking conditions

Profile, diameter and run-out tolerances shall be checked on the finished pulley without surface coating.

3.3.2 Groove-to-groove diameter tolerances

The variation in diameters between the grooves in any one pulley shall not exceed 0,15 mm. This variation is obtained by comparing the diameters over balls or rods.

3.3.3 Radial and axial circular run-out

Radial and axial circular run-outs shall not exceed 0,25 mm full indicator movement (FIM). Run-out in the two directions is measured separately with a ball mounted under spring pressure to ensure contact with the groove as the pulley is rotated.

3.3.4 Diameter over balls

The tolerances on the diameters over balls (K) shall not exceed ± 0,6 mm.

3.3.5 Groove finish

The pulley grooves shall have a surface roughness $Ra \leqslant 3{,}2$ µm. See ISO 254 and ISO 4287 for definitions and the method of measurement.

3.4 Pitch diameter, d_p

The fit of a V-ribbed belt in the corresponding pulley is shown in figure 3. The true pitch diameter of a V-ribbed pulley is slightly larger than the effective diameter and its exact value is determined with the particular belt being used.

A nominal value of the effective line differential, b_e, of 2 mm may be used to calculate the speed ratio. If more precision is required, the belt manufacturer should be consulted.

Further information is given in ISO 8370.

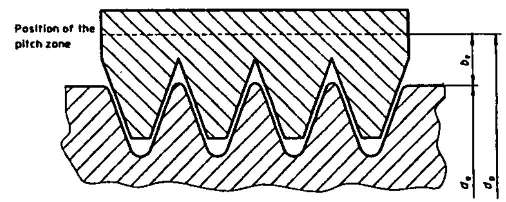


Figure 3 — Determination of pitch diameter

3.5 Designation of pulleys

A V-ribbed pulley for the automotive industry is characterized by the number of grooves, the profile and the effective diameter. It is designated by a series of numbers and letters as follows:

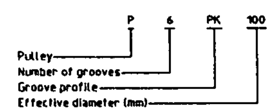
a) the first letter "P" means "Pulley";

b) the first set of numbers indicates the number of grooves;

c) the second set of letters indicates the groove profile;

d) the second set of numbers indicates the effective diameter, in millimetres.

EXAMPLE



4 Belts

4.1 Belt dimensions

The dimensions of the PK belts are shown on figure 4 and given in table 2.

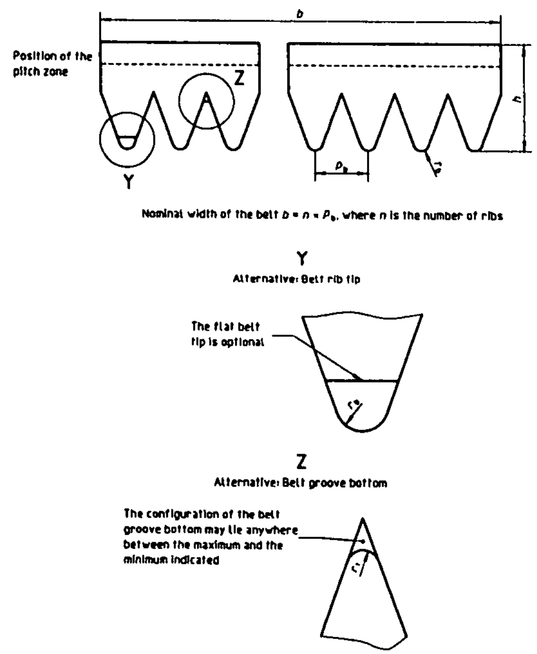


Figure 4 — Cross-section of belt

Table 2 — PK belt dimensions

Dimensions in millimetres

Rib pitch, p_b		3,56
r_b	min.	0,5
r_t	max.	0,25
Belt height, h	≈	4 to 6

NOTE — Rib pitch and belt height are shown as reference dimensions only. Cumulative rib pitch tolerance is an important value but it is frequently affected by the tension at which the belt operates and the modulus of the tension member.

4.2 Measurement of the effective belt length

4.2.1 Measuring fixture (see figure 5)

The effective belt length shall be determined by placing the belt on a measuring fixture composed of the following elements.

4.2.1.1 Two pulleys of equal diameter, one of which is fixed and the other movable.

Their profile shall comply with figure 1 and table 1, and their recommended effective diameter shall be determined from the values given in table 3.

4.2.1.2 Device for applying a total measuring force to the movable pulley.

4.2.1.3 Device for measuring the centre distance between the two pulleys.

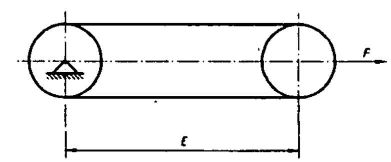


Figure 5 — Measuring fixture to determine effective length

4.2.2 Measuring force

The measuring force to be applied for measuring the effective length of belts is given in table 3.

Table 3 — Measuring pulley and measuring force

Dimensions in millimetres and measuring force in newtons

Pulley effective circumference (at level of effective diameter), U_e		300
Diameter over balls or rods, K	± 0,13	96,48
Measuring force per rib, F		100

4.2.3 Procedure

To measure the effective length of a belt, rotate the belt at least two revolutions to seat it properly and to divide the total force equally between the two strands of the belt.

Then measure the centre distance between the pulleys, E, and calculate the effective length, L_e, of the belt using the following formula:

$$L_e = E_{max} + E_{min} + U_e$$

where

U_e is the effective circumference of the measuring pulleys;

E_{max} is the maximum centre distance between the pulleys;

E_{min} is the minimum centre distance between the pulleys.

4.3 Designation of belts

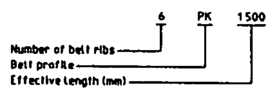
A V-ribbed belt for the automotive industry is characterized by the number of belt ribs, the profile and the effective length. It is designated by a series of numbers and letters as follows:

a) the first set of numbers indicates the number of belt ribs;

b) the letters indicate the belt profile;

c) the second set of numbers indicates the effective length, in millimetres.

EXAMPLE



Annex A
(informative)

Bibliography

[1] ISO 8370-2:1993, *Belts drives — Dynamic test to determine pitch zone location — Part 2: V-ribbed belts.*

[2] ISO 9982:1998, *Belt drives — Pulleys and V-ribbed belts for industrial applications — PH, PJ, PK, PL and PM profiles: Dimensions.*

ICS 43.060.10

Descriptors: road vehicles, internal combustion engines, belt drives, pulleys, grooved pulleys, belts, power transmission belts, V-belts, dimensions, designation.

Price based on 8 pages

RELATED PROCEEDINGS

APPENDIX

None.